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ABSTRACT

Contestation can be defined as a process in which self-interested individuals and groups in a social organization cooperate, compete, and negotiate in a complex interaction aimed at solving social problems. This dissertation explores the notion of contestation in the field of environmental education. In the first part of the document a framework for critique is developed, beginning with an overview of issues in the field of environmental education and leading to descriptions of the nature of science, innovation, and educational research and evaluation. Part II traces developments in environmental education including those pertaining specifically to Australia, as well as those that are international in scope and those that are examples of local programs. Part III argues that contestation takes place in the domains of: (1) language or policy in environmental education; (2) organizational strategies aimed at initiating or improving environmental education; and (3) educational practices conducted in the name of environmental education. The last part of the document addresses several contesting forms of educational research. It argues that those grounded in the social sciences are both the best justified and most promising approaches to research in environmental education. (TW)

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CONTESTATION AND CONTINUITY IN EDUCATIONAL REFORM:
A CRITICAL STUDY OF INNOVATIONS IN ENVIRONMENTAL EDUCATION

by

IAN MORRIS ROBOTOM

B.Sc.(Hons); B.Ed.; M.Ed.

A Thesis submitted in total fulfilment
of the requirements of the degree of

DOCTOR OF PHILOSOPHY

School of Education

DEAKIN UNIVERSITY

July, 1985

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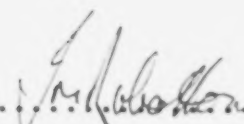
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Signed..........

Date 22 July 1985.....

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SUMMARY

This study explores the notion of contestation in environmental education. Contestation is a process in which self-interested individuals and groups in a social organisation cooperate, compete and negotiate in a complex interaction aimed at solving social problems. A "framework for critique" is developed, comprising technicist, liberal/interpretive and critical paradigms in each of scientific knowledge, educational innovation, educational research and education itself. This framework forms the basis from which a critique is mounted of contesting perspectives in environmental education at international, national and local levels.

The thesis argues, firstly, that contestation takes place in the domains of

- (a) language or policy in environmental education;
- (b) organisational strategies aimed at initiating or improving environmental education;
- (c) educational practices conducted in the name of environmental education; and
- (d) within perspectives between these domains.

The thesis argues, secondly, that the presently dominant technicist models of innovation expressed in the organisation of environmental education are part of an hegemonic relationship which acts to "technologise" the innovation: they provide an organisational strategy for establishing environmental and educational progress

without offering a theory for self-reflection and ideology-critique. The incompatibility of certain contesting perspectives and practices is masked, thus contributing to continuity rather than reform.

The thesis characterises this "educational problem of environmental education" as a series of theory-practice gaps at all levels, where "theory" is the set of beliefs and assumptions held by individual practitioners, and in terms of which they understand their educational practices. An educational problem exists because these theory-practice gaps exist; the educational problem continues because these theory-practice gaps exist unacknowledged within the infrastructure of environmental education due to the effects of false consciousness and hegemony.

The thesis addresses the issue of which of several contesting forms of educational research offers the most coherent response to the educational problem of environmental education, and argues that, for the time being, approaches grounded in the critical social sciences are both the best justified and most promising approaches to educational research for environmental education.

PART I: A FRAMEWORK FOR CRITIQUEPREAMBLE

The most recent intergovernmental conference on environmental education (Tbilisi, Russia: 1977) developed a number of recommendations intended to be influential in shaping environmental education as an innovation over the succeeding years. These recommendations transcend a concern with "the role, objectives and guiding principles of environmental education", and urge that member states of the United Nations carry out research concerning "...the epistemological and institutional structures that affect consideration of environmental demands..." and "...the obstacles (epistemological, cultural or social) restricting access to educational messages and their utilization"(1).

This thesis is within the spirit of these latter recommendations. The thesis aims to address the epistemological and social structures which influence the environmental education movement. The thesis will have three themes:

- (i) a critique of the environmental education movement in formal education;
- (ii) a critique of models of science, innovation, and educational research and evaluation invoked in attempts to understand environmental education as educational reform;
- (iii) environmental education in prospect: an argument for logical coherence in educational research and evaluation in the field of environmental education.

1. "Recommendations of the Intergovernmental Conference on Environmental Education, Tbilisi (USSR), 14-26 October 1977". In UNESCO. Environmental Education in the Light of the Tbilisi Conference , Paris:UNESCO, 1980.

CHAPTER 1: AN OVERVIEW OF ISSUES OF THE FIELD

1.1 The Problematic Nature of Environmental Education.

The environmental education movement has had a considerable impact internationally (1). In formal education in Australia, for example, the impact has been significant, with generally increased levels of environment-related activities taking place. Quantitative measures of the impact can be found in the number of schools purchasing environmental education curriculum materials (2), and in the membership records of the newly-founded Australian Association for Environmental Education (3). It is fairly safe to say that the environmental education movement has now touched most of the primary and secondary schools in this country (4).

Environmental education appears to qualify for the descriptor "educational innovation", by virtue of its interdisciplinary aspiration, its emphasis on out-of-classroom activities, and its inquiry orientation. As is to be expected with any innovation, the early history of environmental education is marked by the emergence of a number of issues concerning environmental education discourse, practice and organisation.

Some of these issues concern the language of environmental education, in particular its definition and the elaboration of environmental education policy. The

question, "What do we really mean by EE?" has been the subject of prolonged debate(5). The debate about definition continues to take a high profile. Different environmental educators have interpreted the goals of environmental education in different ways. Depending on their orientations, environmental educators react differently, therefore, to different contemporary forms and practices of environmental education. Take, for example, perhaps the most widely-accepted goal statement for environmental education, developed at the Belgrade International Workshop on environmental education in 1975:

To develop a citizenry that is aware of, and concerned about the total environment, and its associated problems, and which has the knowledge, attitudes, motivations, and skills to work individually and collectively toward solutions of current problems and prevention of new ones(6).

This statement could be taken as a legitimization of an approach to environmental education which emphasises the development of specific, technical problem-solving skills drawn from the natural sciences, much in the way that many environmental science courses do. It could also be taken as suggesting a socially-critical perspective(7). Some environmental educators advocate a view of environmental education as concerned not only with "retrospective aspects" to do with the preservation of existing human/environment relations, but also with "prospective aspects" to do with the anticipation of a new social order in which humankind will be engaged in "closer dialogue with nature"(8). For such advocates, the "problem solving" prescription of environmental education entails an orientation towards contemporary topics of social

conflict. It leads the school towards "dangerous knowledge" -- knowledge which questions the interests and operations of certain groups in society(9). Such an orientation has political implications, as outlined by one advocate of a controversial-issues approach to environmental education:

This awareness of environmental problems is social awareness rather than ecological awareness. Such problems will be solved through collective action aimed at eradicating the social and economic causes of the degradation of the human environment. The political aspects of this search for solutions may give rise to conflicts of various kinds. One such conflict, and not the least, is the collision between the educational system and the private interests which operate in alliance with the powers of the State(10).

It is in this sense that environmental education can be interpreted as being concerned with socially-critical education. It should be noted, however, that differences in perspectives about the orientation of environmental education (an environmental literacy/technical skill development orientation vis-a-vis a socially-critical orientation) are a continuing issue for environmental education (11).

Some of the issues in the early history of environmental education are expressed at the level of school and classroom practice . For example, there are concerns about the resonances between environmental education and such institutional characteristics as the disciplinary structures of schooling (12), and the role of the teacher (13). There is talk of the tendency in schooling to "retreat to the disciplines", and warnings

that to do so in the case of environmental education may lead to an overemphasis on the discipline and the loss of the interdisciplinary objectives of environmental education (14). Yet the dominant trend in strategies for the incorporation on an environmental dimension into the formal educational setting is still to adopt a disciplinary orientation and to "infuse" content relative to various environmental problems into (particularly) the natural sciences (15). The role of the teacher in environmental education is problematic, with an apparent mismatch between conventional teaching practices and the intentions of some forms of environmental education pedagogy which emphasise students' undertaking independent studies as individuals or in small groups (16) and the development through environmental education of autonomous thinkers (17). Such pedagogical approaches place considerable demands on those teachers who feel comfortable with the authority hierarchy embedded in traditional schooling.

A third range of issues in the field of environmental education includes concerns about the organisation of environmental education as educational change. While several years ago the major task for sponsors and advocates of environmental education was thought to be the formulation and dissemination of curriculum materials which could convey environmental messages to students of all ages (18), the issue of communication about environmental education in 1985, while still regarded as central, is now viewed rather differently. At the 1982

national Australian conference in environmental education, the view was advanced that availability of materials (curriculum kits and other resources) was no longer a major constraint to institutionalisation of environmental education (19). Nevertheless, some writers point to the fundamental epistemological and pedagogical problems posed by dominant conceptions of knowledge, teaching and schooling, claiming that environmental education curriculum materials in their present form and method of development tend to perpetuate a discrepancy between rhetoric and practice in environmental education (20). The issue is now beginning to be seen as one of communicating and developing a complex perspective on environmental education through a process of sharing experiences in the practice of teaching environmental education activities. Put simply, this issue is whether the establishment and improvement of environmental education programs is best achieved through "centre-periphery" approaches, or through loosely-affiliated local school initiatives. The operations of the Curriculum Development Centre's Environmental Education Project (21) was influenced by the debate about this issue.

The continuation of debate about such issues at the levels of language, organisation, and practice suggest that environmental education continues to be problematic in definition, status and direction. There are concerns that environmental education may not be addressing itself to the economic, social and political pressures on the environment (22), that as an innovation that is

potentially counter-hegemonic (23) environmental education is losing its way as it is accommodated into the existing structures of institutional schooling (24), and that in short environmental education as socially-critical education is faltering if not failing (25). This thesis will consider these kinds of issues in greater depth in mounting a critique of the environmental education movement (Parts II and III).

1.2 Environmental Education and Innovation

The history of environmental education is of interest to a broader audience than that of environmental educators. Despite its relatively recent origin, the theme of environmental education directs our attention to a number of problems, both old and new, concerning the question of what education (in general) is and what it ought to be, in a world society suffering profound and persistent crises(26).

This thesis will attempt to explore the reasons for the successful "quantitative change" aspect of the environmental education innovation -- the increase in the amount and types of environment-related activities -- and the reasons for the apparent lack of "qualitative change" along the dimension of socially-critical education. If it is valid to claim that education is part of the ideological apparatus of the state (27), and that environmental education offers a comprehensive challenge to the dominant practices, functions and ideologies of

schooling (28), then in order to understand the types of barriers that environmental education as an innovation is encountering, one needs to adopt a critical perspective on the institution of education -- to treat as problematic the assumptions on which schooling is built. It is necessary to try to identify the taken-for-granted presuppositions of institutional education (for example, its view of knowledge, view of the role of curriculum, view of educational change). It is also necessary to try to understand the relationships between these presuppositions and those underpinning the charter of environmental education. This approach is, in fact, prescribed by the Tbilisi conference(29).

For some, the innovation of environmental education has its strongest roots in nature studies and natural science(30), though advocates of other interests (for example, progressive education and consumer studies) have shaped its development. It is to be expected that its manifestation in schools has been shaped by the dominant paradigms of natural science and educational change that influenced its development.

However, the paradigm of natural science may have limited application if environmental education is to continue to move along the path towards socially-critical education envisaged by some of its advocates, for example at Tbilisi. The research traditions of natural science, if unthinkingly applied in research and evaluation in environmental education, may support a form of

"disciplinary chauvinism"(31) which is capable of acting as a major barrier to the successful manifestation of interdisciplinary environmental education. The natural science paradigm supports the notion of a rational, means-end, fragmentary, and value-free logic of problem-solving -- a notion fundamentally predicated on a fact/value distinction with primacy ascribed to knowledge (facts) rather than to values. However, the form of decision-making invoked in the resolution of environmental problems may be as much a matter of commitment or will as of knowledge(32) -- value-judgements in environmental problems concerned with quality of life issues may be ineradicable.

It is said that environmental education as socially-critical education ought to be concerned with developing the autonomy and responsibility of students(33). Clearly, in matters where aspects of the environment are "up for grabs" and open for exploitation, the environment needs on its side a population possessing the qualities of independent thinking and social responsibility required to mount an effective critique of the exploitation options available. For better or for worse, society possesses the technology for a range of interventions of great environmental impact. To improve the chances of prudent interventions taking place, we need to develop effective social, political and procedural resources for critique. The "banking concept"(34) of conventional education (the accumulation of information as abstract propositions divorced from their contexts of use

and social significance) may be inappropriate to this task, as it supports an authority hierarchy between students and teacher which itself mitigates against the development of independence on the part of the learner. On close inspection, several conventional teacher activities can be seen to maintain a dependency relationship between learner and teacher(35). Further, as a consequence of its heavy emphasis on the learning of knowledge in didactic teaching/learning situations, conventional education creates the impression of the possibility of a separation of knowledge from action -- a hostile setting for the sort of praxis-based education advocated for environmental education(36).

Traces of the influence of the natural science paradigm in environmental education are also evident in prescriptions for, and actions taken in, the improvement of environmental education in schools. For example, the factors cited by Perrott for increasing environment-related studies in schools are typical:

- (i) the reformation of science curricula;
- (ii) production of suitable texts and other materials;
- (iii) creation of a working partnership between the schools and information services outside the school;
- (iv) development of areas which give facilities for environmental studies by schools and colleges(37).

The influences of a natural science paradigm are evident in the view that environmental education is well served by an extension of science curricula; in the technicist conception that educational change is well served by the development of appropriate texts; and in the overall "industrial metaphor" of a centre-periphery model

of innovation.

This natural science-based view of educational change is seen by House(38) as a dominant perspective in the broader field of educational innovation. This perspective is termed technological by House and is epitomised by the presently widespread "Research, Development, Diffusion, Adoption (RDDA)" model, according to which educational change is a matter of extensive research, materials development, and effective distribution of the materials. House characterises the model in this way:

New knowledge that served as a basis for development was advanced during the research stage. A solution to the operating problem was invented and built during the development stage. The innovation was introduced to practitioners in the diffusion stage. Finally, the innovation was incorporated into school systems in the adoption stage.

The technological perspective of innovation gains its name from the type of assumptions upon which it is predicated. These are consonant with the assumptions of a wider technological society: a rational sequence of activities, massive planning, a division of labour, high development costs, and a passive consumer at the end of the RDDA chain who will adopt the innovation(39). The perspective assumes consensus as to the purpose of the innovation on the part of all those involved -- developers, disseminators and implementers are assumed to have similar "views of the world" in respect of the purpose of education in general and the nature of teaching in particular. Neither the values held by participants, nor the settings or contexts of their work, is considered significant by the RDDA

approach.

The natural science-based, technological perspective of innovation may be widespread, but it is not unchallenged. House himself, when surveying the field over the decade of the seventies, speaks of two other dominant perspectives, the "political" and the "cultural". To take up just the "political" perspective to innovation discussed by House, it is clear that the perspective construes and interprets innovation problems not as technical inefficiencies, but as political conflicts and compromises among factional groups, such as developers, educational consultants, school administrators, and implementers (40). With innovation problems perceived this way, it is important during the process of innovation to actively foster face-to-face interaction, in order to permit the confrontation and negotiation of differing views of the innovation. The medium of innovation is discourse -- two-way questioning, persuading, compromise. In short, effective dialogue between policy-maker and practitioner is the key to effective innovation according to the political perspective. This perspective assumes the existence of value conflicts (different "views of the world" in respect of curriculum and classroom practice) between respective participants in the innovation, the need for opposing factions to bargain and compromise, and the probability that compromise can ultimately be achieved successfully.

Other writers, for example Hall(41) and Popkewitz(42),

espouse different perspectives to innovation. While the details of these perspectives need not concern us here (they will be considered in greater depth in Parts II and IV), it is important to note first that alternative conceptions to the natural science-based technological one do exist, and second, that from their different perspectives, different sets of issues about innovation (in general or in environmental education in particular) come into focus. Put simply, different perspectives on innovation exhibit different sensitivities to, and alternative constructions of, the issues and problems of environmental education. The questions about environmental education which may be asked from the technological perspective in order to determine its sensitivity to the issues and problems of environmental education may include the following:

(i) can environmental education programs be effectively planned and developed by a geographically-distant outsider -- that is, can the activities of an effective program be anticipated, and can the difficulties and constraints encountered by individual teachers in different settings be foreseen and accommodated in the innovation?

(ii) is the classroom teacher a "passive consumer" in the sense that his/her presuppositions about curriculum and classroom practice have no real effect on the operationalisation of the innovation?

(iii) what evidence is there that materials alone, or with attendant short-term inservice support, can induce

a sustained change in teacher behaviour?

(iv) does the disseminator's view of teaching and curriculum influence the messages about the innovation that the teacher receives?

Questions relevant to the determination of the "fit" of the political perspective to the history of environmental education include the following:

(i) is there evidence of competing factional groups in cases of environmental education innovation?

(ii) has personal contact and dialogue between teacher and developer occurred, and is it an important factor?

(iii) has mutual adaptation or curriculum negotiation taken place in respect of the innovation?

(iv) What political elements have emerged as relevant in the operationalisation of the innovation?

The foregoing has attempted to establish that when environmental education is regarded as an innovation, there are grounds for taking up the Tbilisi prescription for research on the epistemological and institutional structures affecting the movement. There are a number of problematic issues to do with the relationship of the natural science paradigm and the innovation's characteristics of interdisciplinarity and social critique, and to do with the views of educational change adopted in seeking to understand the innovation. Part III and IV of this dissertation will engage these issues.

1.3 Environmental Education and Educational Research

Educational innovation and educational research may be shown to be fundamentally interrelated. An educational innovation like environmental education comprises a language for expressing what it is about, a set of organisational or decision-making procedures, and a set of school-level practices all more or less coherently enacting a set of social and educational values deemed to be significantly different to those enacted in existing, institutionalised education. Innovations may be understood in terms of models of innovation -- the models offer a structure and a language for discussing and construing innovations and the educational problems they give rise to. The models themselves are synthesised from experiences and information gained in respect of the objects (innovations in general) they seek to explain, and that information is gained through educational research. Research informs the models as it engages educational problems, though at the same time the adequacy of the particular form of educational research employed is also "tested" in a dialectical process of the development of both education and research.

If (as suggested in 1.1 and 1.2) the institution of schooling -- and its conventional curriculum and classroom practices -- is to be treated as problematic and open to critique in an endeavour to understand the issues involved in environmental education innovation, then one ought properly also to consider as problematic the mode of

educational research through which such understandings are sought, and which informs the models of educational innovation which seek to structure those understandings. Given the tendency for research paradigms to shape researchers' perceptions of the objects of their research(43), it is unwise to accept uncritically any particular model of educational research. A more critical stance is to identify the presuppositions embedded in models of research and to consider the coherence between those presuppositions on the one hand, and the presuppositions guiding environmental education on the other.

Forms of educational research differ in their purposes, limits, power, foci and assumptions. For example, some forms of educational research are based on the positivist epistemology of the natural sciences, some on the subjectivist epistemology of the hermeneutic sciences, and some on the dialectical epistemology of the critical social sciences(44).

Once the existence of different approaches to educational research is acknowledged, and their differing "political theories" understood, it becomes clear that a deliberative choice is entailed for environmental educators attempting to construe the object of their endeavours and to engage the issues associated with professional development in environmental education. This deliberation is a major focus in Part IV of this dissertation.

1.4 Structure and Theses

This thesis is structured in four main parts. The remainder of this Part explicates a framework for critique of an innovation like environmental education. Part II presents an "archive" --- made up of selective accounts of developments within the environmental education movement at the international, national, and local levels --- as a starting point for closer analysis. Part III engages in a critique of the environmental education movement, illustrating contestation of ideas at the levels of language, organisation, and practice. Part IV considers the resonances between different approaches to educational research and evaluation on the one hand, and the problems of a socially-critical form of environmental education on the other. Part IV thus considers the issue of whether there exists a coherent epistemology of environmental education, educational innovation and educational research which would enable the development of a socially-critical form of education in keeping with the aspirations of the authors of the Tbilisi Declaration and associated documents. The last Chapter of Part IV is a summary of the arguments of the whole thesis.

The study reported here explores four central theses:

(1) that while the language of environmental education, though contested, advocates educational reform, educational practices conducted in the name of environmental education, though also contested, represent continuity rather than change, to the extent that the innovation fails to meet its socially-critical aspirations and supports existing institutional structures and practices;

(ii) that the presently-dominant models of educational innovation expressed in the organisation of environmental education are part of an hegemonic relationship which acts to "technologise" the innovation (to mask the incoherence of certain contesting perspectives and practices), thereby contributing to continuity in the face of reform;

(iii) that this "technologisation" of the substance of environmental education and institutionalisation of environmental education as an innovation cannot be addressed from within conventional approaches to educational research (for example, positivist and interpretive approaches), but can be addressed from the critical perspective of ideology critique; and

(iv) that environmental education requires an epistemology which coherently relates the socially-critical aspirations of environmental education to a view of educational change and a view of educational research, and that this relationship can be achieved in a critical perspective which links facts with values and knowledge with action, and which engages those involved in environmental education theory and practice in ideology-critique.

NOTES

1. See for example the five volumes of ERIC/SMEAC'S Environmental Education in Action series, in particular Environmental Education in Action - V: International Case Studies in Environmental Education (Cowan, M.E. and Stapp, W.B., edd. December 1982).

2. In 1980, the Curriculum Development Centre published a kit of environmental education curriculum materials entitled "Investigating the National Estate". Some 600 copies were sold in a 3 month period after the kit's release. See Robottom, I. Report of a Study of Dissemination and Implementation of 'Investigating the National Estate'. Deakin University, Geelong/Curriculum Development Centre, Canberra, 1981.

3. The Australian Association for Environmental Education was founded in 1980. Its membership records for the ensuing years are -- 1980:120, 1981:100, 1982:140, 1983:235, 1984:250, 1985:280.

4. The dissemination strategy used by the Curriculum Development Centre for its "Investigating the National Estate" and "Environmental Education Project" curriculum materials involved the mailing of promotional leaflets to all schools in the country. See Robottom, I. (op.cit. - see note 2).

5. See for example Kelly, P.J. "What do we really mean by EE?", in Hughes-Evans, D. Environmental Education: Key issues of the future. Oxford: Pergamon, 1977.

6. This goal statement was adopted at the Belgrade conference on environmental education in 1975 in preparation for the 1977 Intergovernmental Conference on Environmental Education held in Tbilisi, USSR. See Unesco, 1975. The International Workshop on Environmental Education, Belgrade, Yugoslavia, 13-22 October, 1975, Final Report, Paris, France: The International Environmental Programme, Unesco-UNEP.

7. An explication of the "socially-critical" perspective is provided by Kemmis, S., Cole, P., and Suggett, D. Orientations to Curriculum: Towards the Socially-Critical School. Melbourne: Victorian Institute of Secondary Education, 1983:

According to the proponents of the socially-critical orientation, education must engage society and social structures immediately, not merely prepare students for later participation. It must engage social issues and give students experience in working on them - experience in critical reflection, social negotiation and the organisation of action.

8. Vidart, D. "Environmental education -- theory and practice", Prospects, VIII (4): 466-479 (1978).

9. See Maher, M., "Obstacles to Environmental Education -- a hegemonic hypothesis". Paper delivered at the second national conference of the Australian Association for Environmental Education: Brisbane, Australia, July 2, 1982.
10. Vidart, D. (op. cit.- see note 8).
11. Walsh, M. "Environmental education: a decade of failure but some hope for the future". Australian Journal of Environmental Education 1(1):21-24 (July 1984).
12. Wigston, D.L. "Problems of Subject Integration in Environmental Science", in Hughes-Evans, D. Environmental Education: Key issues of the future . Oxford: Pergamon, 1977.
13. Perrott, E. "Environmental Education - Key Issues of the Future: The Role of thw Educator", in Hughes-Evans, D. Environmental Education: Key issues of the future . Oxford: Pergamon, 1977.
14. Nicholas, J.R., "Environmental Education in Australia: Some Bases for Action". Paper presented at the National Conference on Environmental Education, Brisbane, July 14, 1977.
15. The Unesco Newsletter, "Progress, Trends and Prospects in Environmental Education" (Connect VII(3) September 1982) makes this point, and goes on to discuss the problems that the institutional characteristic of disciplinary specialism poses for interdisciplinary environmental education.
16. Perrott, E. (op. cit - see note 13)
17. Swan, J., "Afterword" in Cohen, M.J. Prejudice Against Nature , Freeport, Maine: Cobblesmith, 1983.
18. Brindley, T.A. "Environmental Education and the Philosophy of Education", Journal of Thought , 12 (2): 152 - 9, 1977.
19. Stapp, W.B., in concluding remarks to a symposium entitled "Latest Trends in Curriculum Materials" at the Second National Conference of the Australian Association for Environmental Education, Brisbane, June 27 - July 2, 1982.
20. See for example: Stevenson, R. "Curriculum materials for United States & Australian schools: An explanation of the theory-practice gap in environmental education?", a paper presented at the International Conference of the North Americal Association for Environmental Education, Chateau Lake Louise: Canada, October 1984; and Robottom, I. "Why not education for the environment?" Australian Journal of Environmental Education 1 (1): 11-13 (July, 1984).
21. Robottom, I. The Environmental Education Project:

Evaluation Report. Deakin University, Geelong / Curriculum Development Centre, Canberra, 1983.

22. Withrington, D., "The Unesco-UNEP Environmental Program and its Implications for British E-E" in Hughes-Evans, D.(ed.), Environmental Education: Key Issues of the Future . Oxford: Pergamon, 1977.

23. Maher, M. (op. cit - see note 9).

24. Annette Greenall was closely involved in the activities of the national Curriculum Development Centre during the period in which the Centre produced the "Investigating the National Estate" and "Environmental Education Project" curriculum materials. In Greenall, A. "Environmental Education: a Case Study in National Curriculum Action", Environmental Education and Information , 1 (4): 295-294 (1981), she states:

Environmental education is concerned with counter-hegemony or social reconstruction and I argue that it has been subjected to incorporation within the existing hegemony in a neutralised form -- the radical 'action' components having been deleted and the less controversial cognitive and skill ones retained, together with the name 'environmental education'.

25. See Maher, M. (op. cit. - note 9), & Walsh, M. (op. cit. - note 10).

26. Vidart, D. (op. cit. - see note 8).

27. Althusser, L. 'Ideologie et Appareils Ideologiques de l'Etat', La Pensee (Paris), 151, 1970.

28. Maher, M. (op.cit - see note 19).

29. See Preamble note 1.

30. Stapp, W.B. & Cowan, M.E. "Introduction" in Stapp & Cowan (eds.) Environmental Education in Action V: International Case Studies in Environmental Education . Columbus, Ohio: ERIC, 1982.

31. The term "disciplinary chauvinism" was coined by Arthur Lucas in his book Environment and Environmental Education. Kew, Victoria: Australian International Press and Publications, 1978.

32. Kelly, P. (op. cit. - see note 5).

33. Jim Swan, in an "Afterword" to the new book Prejudice Against Nature states his belief that development of autonomous thinkers is a key strength of the Audubon Society Expedition Institute -- in order to get away from "the weakness inherent in traditional education of relying upon rote memorization of material from authoritarian people". (op. cit -- see note 17).

34. Freire, P., Pedagogy of the Oppressed , New York: Herder and Herder, 1971.
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37. Perrott, E. (op. cit. - see note 13).
38. House, E. "Technology versus Craft: a Ten Year Perspective on Innovation". Journal of Curriculum Studies 11 (1): 1-15 (1979).
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43. For a sociohistoric analysis of this point in relation to scientific research, see Kuhn, T. The Structure of Scientific Revolution , Second edition, University of Chicago Press, 1970. For a discussion of the proposition that one's educational research also conveys a commitment to educational values, see Carr, W. "Philosophy, Values & Educational Research". A mimeograph of the University College of North Wales, Bangor, Gwynedd, Wales.
44. See Carr, W. and Kemmis, S. Becoming Critical: Knowing through Action Research . Geelong, Victoria: Deakin University, 1983.

Preamble

In order to understand a concrete historical structure like environmental education, and to argue the present thesis, we need to broach some fairly substantial epistemological arguments.

Environmental education, above all, is a manifestation of a particular perspective on education: environmental education, which "should help the public to question its misconceptions concerning the various problems of the environment and the value systems of which these are a part "(1) is an example of a socially-critical orientation to education. By virtue of its socially-critical orientation, environmental education earns the status of educational innovation: it "requires the application of new concepts, new methods and new techniques as part of an overall effort stressing the social role of educational institutions and the establishment of a new relationship between all those engaged together in the educational process"(2). As an innovation, environmental education gives rise to a number of educational problems, which raise the issue of an appropriate form of educational research. Another issue -- a focus of this thesis -- is the coherence between the differing perspectives on education, innovation, and research that find expression in environmental education; articulation of the issue of coherence requires a consideration of the view of scientific knowledge informing these perspectives.

In each of these "dimensions" (of scientific knowledge, innovation, research, and education itself), there exists a range of contesting perspectives. For example, some views of science suggest that observations are not influenced by personally-held presuppositions; some suggest these presuppositions exist but that their effect can be minimised in a deductive testing phase; and some claim that all knowledge is necessarily presuppositionalist. Some perspectives on innovation see social change as a neutral, administrative process; others claim that change necessarily involves questions of ideology. Educational research is seen by some as an applied science in which a division of labour exists between researcher and practitioner; for others, educational research, if it is to be educational, must be participatory and democratic. The aim of education itself is seen variously as vocational competence, individual self-expression, and collaborative, constructive critique of a responsive society. As we shall see, examples of this sort of contestation are readily found in environmental education.

The thesis

"that environmental education requires an epistemology which coherently relates the socially-critical aspirations of environmental education to a view of educational change and a view of educational research, and that this relationship can be achieved in a critical perspective which links facts with values and knowledge with action, and which engages those involved in environmental education theory and practice in ideology-critique"

depends upon a critique of the coherence of contesting perspectives on scientific knowledge, innovation, research and education with environmental education. That is, the justification for this Chapter is that to engage in a substantial curriculum critique of environmental education as foreshadowed in the stated thesis, there is a need, as a logically prior step, to develop a synthesis of arguments relating to the four "dimensions" (of scientific knowledge, innovation, research and education itself) into a coherent framework of critique.

2.1 The Nature of Science and Scientific Knowledge .

Modern science is under attack: there is a feeling of disenchantment with the activity which was formerly deemed to lead to perpetual material progress and to provide a kind of secular salvation for all mankind. Under the threat of pollution, the population explosion and the partial disruption of the balance of nature, the most basic assumptions of science are under challenge - the objectivity of its methods, its very rational ideology, is being questioned(3).

This quotation illustrates a perceived link between science and environmental education -- or more specifically between characteristics of the nature of scientific knowledge (its "objectivity" and "rationality") and environmental problems ("pollution", "population explosion", "balance of nature"). Clearly, any form of education which seeks to improve students' abilities in the critical appraisal of environmental problems ought to include, in its own deliberations, the nature of science and of scientific knowledge.

Since the late 19th century, science has been thought of as a generator of the positive sort of knowledge required for "perpetual material progress", as the way for humankind to escape the domination of knowledge based only in opinion, impression, habit, mythology and uninformed hunches. Positive knowledge was what could be "proven", so if science was to claim for itself that status of knowledge, or of the generator of knowledge, then its theoretical statements had to be "provable"(4). To this end, there were attempts to establish a logic of science .

Science is also empirical: it is concerned with observations (sense data, or data obtained from instrumental extensions of the senses). However, the relationship between sense data (or observation) and knowledge is problematic. This section seeks to outline different views of the nature of science, their different perceptions of the relation of observation and knowledge, and their different epistemological claims about rationality, objectivity, and truth.

(a) Empiricist Views of Science

(i) Inductive Thought

Early empiricist scientific traditions had their roots in inductive empiricism. According to induction, science proceeds from observation to knowledge by a process of generalising from a number of specific observations. It was believed that induction was a logical process of thought which, starting from factual statements arising out of evidence of the senses, could lead with certainty to the truth of universally-applicable general laws. In the words of Medawar:

What induction implies in its cruder form is roughly speaking this: scientific discovery, or the formulation of scientific theory, starts with the unvarnished and unembroidered evidence of the senses. It starts with simple observation - simple, unbiased, unprejudiced, naive, or innocent observation - and out of this sensory evidence, embodied in the form of simple propositions or declarations of fact, generalisations will grow up and take shape, almost as if some process of crystallisation or

condensation were taking place(5).

The empirical character (concerned with sense data) of this formulation of science is clear; equally clear is the perception of knowledge developing in a logical, systematic fashion out of observation. This perception allows advocates of the inductive formulation to claim that inductive empiricism is objective in the sense that the process from observation to knowledge is value-free; is rational in the sense that the process is systematic, logical and linear; and productive of truth that is certain and absolute. The single process of inductive empiricism was seen as both discovering and proving general propositions.

These central claims of inductive empiricism are, however, strongly contested. The most fundamental objection attacks the logical status of induction: "it simply is not logically possible to arrive with certainty at any generalisation containing more information than the sum of the particular statements upon which that generalisation was founded, out of which it was woven"(6). The problem is that there are no valid logical arguments which allow us to be certain that unobserved events or experiences will be of a certain kind. In the words of Hume(7), "even after the observation of the frequent or constant conjunction of objects, we have no reason to draw any inference concerning any object beyond those of which we have had experience". Hume's argument rests on the distinction between induction and deduction; through deduction, it is argued, incontrovertible conclusions can

be drawn. An example of the logical certainty of deduction is provided by the syllogism:

Premiss 1: All insects have legs.

Premiss 2: All beetles are insects.

Conclusion: Therefore, all beetles have legs.

Given the truth of the two premises, the conclusion must be true. The same logical certainty cannot be ascribed to the conclusion in the following inductive argument

Premiss All insects examined have six legs.

Conclusion The next insect I examine will have six legs.

Note that the point is not concerned with the power of the generalisation (or premiss); it is simply contrasting the logical certainty of derived conclusions in deduction with that in induction.

A second contested claim of induction is that observation can be objective. This claim is regarded by Medawar(8) as "philosophic fiction"; he says that

there is no such thing as unprejudiced observation. Every act of observation we make is biased. What we see or otherwise sense is a function of what we have seen or sensed in the past.

Popper(9) is another critic of inductive thought, claiming that all observations are necessarily selective, and that all observations have a frame of reference. There are two points here that the "simple" inductive notion of

objective observations fails to counter. The first is that out of the great range of phenomena existing in our environment, only a minute fraction of them is susceptible to detection by human senses or their instrumental extensions; further, that of this "minute fraction", only a small number of phenomena is consciously "homed in on" or selected for detailed study. In other words, observation, or more usually active detection, is a directive process. It does not consist of randomly accumulating data, but rather of isolating from all possible data those few that appear relevant to a system's behaviour pattern.

The second point made by Popper is that while any hypothesis is preceded by a set of observations (as proposed by inductive thought), these very observations are themselves presupposed by the adoption of a frame of reference. The action of selecting some from a number of possible observations is governed by a "frame of theories". Popper believes that if we follow a particular line of hypothesis/observation interaction back far enough, we end up with a set of values:

If (observations) were significant, if they created a need for explanation and thus gave rise to the invention of a hypothesis, it was because they could not be explained within the old theoretical framework, the old horizon of expectations. There is no danger here of an infinitive regress. Going back to more and more primitive theories and myths we shall in the end find unconscious, inborn expectations(10).

Popper's view that observations cannot be value-free gains support from a fellow philosopher in Hanson and from

the psychologist Piaget. For Hanson(11), observation is best regarded as a phenomenological encounter between the individual and the aspect of the environment being observed. Observation is an interpretive activity, involving "an interaction between the observer's psychological structures, their mental or conceptual structures, and the ontologically existent object"(12). Piaget's work on internal mental structures leads him to claim that "... it is impossible to talk about objectivity or object without referring back to the previous condition of (the observer's) cognitive organisation"(13), and that hence we cannot know an independent reality but only a constructed reality. This view that all observations are necessarily influenced by a set of personal values is, of course, in direct opposition to the inductive view of objective observation.

A further contested issue is whether there exists a language (a terminology for communicating observations) the units of which are theory-independent. The problem is that the description of an observation presupposes a descriptive language with property words and classes which are needed to make the observation intelligible, and that this language is value-free (theory-independent). Carr and Kemmis(14) argue against the existence of a theory-independent descriptive language:

According to the positivist (natural science-based) view, the basis on which valid theories are constructed is made up of neutral observations that are reported in statements. To be communicated to others, therefore, observations must be formulated in a public language and this means that such a language must

be available prior to observation. The description of an observation, therefore, always presupposes a descriptive language. But languages are not "neutral". Rather they are ways of structuring observations and experiences in particular ways and for particular purposes. Observation statements, in other words, are always interpretations of what is observed in the light of concepts and theories impregnated in the language in which they are stated.

The issues raised so far point to the problematic nature of the inductivist claim of the possibility of objective knowledge. The arguments do not suggest that phenomena cannot exist objectively (in the words of Freeman and Jones(15), that ontological separation between observer and phenomenon is impossible), but that the phenomenon cannot be perceived and reported in a way that is independent of the observer (in the words of Freeman and Jones, that an epistemological separation is impossible). The arguments do suggest that objective perceptions are impossible because of the role of the observer's internal conceptual structures in dealing cognitively with perceptions; and that the process of formulating and communicating observations objectively is impossible because the very language invoked in formulation and communication is itself theory-laden. Thus these arguments are a critique of the inductivist position that the observers' (the researchers') values and interests should not (and in principle at least, do not) distort their work.

(ii) Hypothetico-deductive empiricism

Inductive empiricism sought to establish that a single

act of mind (inductive thought) was involved in discovery and proof(16). Once the alternative idea of separate discovery and confirmation phases is countenanced, other formulations of science become possible. One such alternative is hypothetico-deductive empiricism.

In this alternative, there is a sharp distinction between a discovery phase, in which observations are made and hypotheses framed, and a confirmation phase, where hypotheses are treated with an attempt at confirmation. The discovery/confirmation dichotomy enables an attempt to couple a logic of confirmation (based on deductive logic) with a discovery phase in which the role of values and theory is recognised.

Karl Popper(17) is one philosopher of science who strongly advocates the discovery/confirmation dichotomy. As we have seen, Popper repudiates claims of "objective" observations of phenomena and acknowledges that there cannot be any direct connection between observations on the one hand and generalisations of science on the other. Popper points out the logical insufficiency of inductive inference to the task of explaining how science generates unrestricted generalisations (laws). For Popper, science activity has two important and distinct phases. First, there is conjecture , the creative and imaginative formulation of tentative hypotheses about phenomena. These hypotheses may or may not be based on a number of careful observations; the origins of these hypotheses is not an issue for Popper -- he recognises that they will not be

"objective". The second phase, one aimed at refutation of the conjectured hypotheses, is crucial to Popper's claims about the rational and objective qualities of the enterprise. The refutation phase is based on the assumption that while a candidate general law cannot be verified by observations, it can be conclusively falsified by particular observations. Thus an hypothesis (a candidate general law) is tested through a process of attempted empirical falsification or refutation. In the words of Charlesworth:

The crucial feature of scientific method then is not that it seeks to confirm scientific generalisations by collecting particular instances which confirm those generalisations, but rather it actively seeks to falsify and refute the conjectures or hypotheses put up to explain natural phenomena. It is by progressively excluding falsified conjectures that we approach closer and closer to the truth, although we are never in a position to say finally and conclusively 'This is the truth'(18).

The "objectivity" and "rationality" of this view of science (and its claim to being able to mount a positive, progressive attack on problems) depend on the rigor and extensiveness of attempts at refutation of conjectured hypotheses. For Popper, "a scientist should justify his conclusions by reasoning from well-established empirical premises expressed as statements based on particular observations, using methods of inference which are as explicit and as rigorous as possible. He may not reach certainty but he should always strive for objectivity and rigour"(19). Popper sees this process as occurring within an "open society" or critical community of individuals committed to rigorous attempts at falsification. Thus

hypothetico-deductive empiricism recognises that there can be no "logic of discovery", but proposes a "logic of (dis-)confirmation", ^{of which the} processes are thought to be rational by virtue of their strictly logical (deductive) arguments and objective by virtue of the vigorous critiquing capacity of the members of the "open society" engaging in attempts at falsification. The logical arguments in the process take place when, after hypothesis formulation, certain consequences are deduced which are predictions about what will or will not be the case: it is these deductive consequences of a hypothesis which are put to the test. And the empirical quality of the enterprise is similarly displaced from the discovery phase (in inductive thought, the emphasis is on the objective empirical quality of the observations) to the confirmation phase (in hypothetico-deductive empiricism, the emphasis is on the empirical quality of the testing of the deductive consequences of hypotheses). This shift in emphasis is demonstrated by Popper's claim that "the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability"(20), rather than in the generation of the theory.

The implication of empiricist conceptions of science and of knowledge is that scientific knowledge, by virtue of the objectivity and rationality of the method of its generation, is separable from, and has primacy over, values. There are other, related, characteristics of this epistemology. As a consequence of the specialised nature of effective research traditions employing empirical

methods, a mechanistic outlook has developed in which it is felt that problems need to be fragmented to be understood -- that the "whole" can best be explained by a thorough study of its parts(21). Further, adherents of the empirical conception of science suggest that its rationality and logic -- its modus operandi of eradicating the influence of values by a process of conjecture and refutation in a critical open society -- confer a certain universality to that method and to the explanations it generates.

(b) An Interpretive Science of the Human Spirit

It should not be thought that the empiricist philosophy of science is uncontested. An alternative, "interpretive", view has its roots in biblical exegesis. According to Carr and Kemmis (22), it was first elaborated by 17th century Protestant theologians who wanted to develop a method that would show how the meaning of the Bible could be directly understood from a reading of the text. The method for interpreting the meanings of texts came to be called hermeneutics. Since the 19th century, hermeneutics has been vigorously proposed, in opposition to empiricist constructions of science, as an alternative epistemology for the social sciences. Hermeneutics was at the centre of methodological debates carried on by German-speaking historians and sociologists in the late 19th and early 20th centuries(23). In particular the hermeneutic method of verstehen -- that of developing interpretive constructions of the meanings of actions -- was set

against the empiricist method of causal explanations.

These debates centred on the positivist claim of continuity of scientific method, or as Von Wright(24) puts it, "methodological monism ... the idea of the unity of scientific method amidst the diversity of subject matter of scientific investigation". The argument for hermeneutics rests largely on the proposition that, unlike the objects (for example, behaviours of particles or organisms) of natural scientific investigations, the objects of a social science are intentional actions, and to understand actions entails explication of intentions. For Von Wright, one of the noteworthy features of hermeneutics is the central place held in it by the idea of language and by language-oriented notions such as meaning, intentionality, interpretation, and understanding(25),. In the words of Outhwaite

the important point (is) the identification of an action as an action of a certain sort and an appreciation of its "deeper significance" are to be distinguished from its causal explanation in terms of efficient or of final causes(26).

In these methodological debates, adherents of hermeneutics see the aim of the natural sciences as explanation, and the aim of hermeneutics as understanding of phenomena. As indicated in Outhwaite's comment above, the notion of intentionality underlies the distinction of explanation and understanding: "understanding is associated with intentionality in a way that explanation is not"(27).

Hermeneutics as a form of social science rejects the

positivist claim of "methodological monism". It is claimed by advocates of hermeneutics that an appropriate way of investigating human social life recognises that a distinctive feature of human actions is that "they are meaningful to those who perform them and become intelligible to others as an action of a certain sort only by reference to the meaning the individual actor attaches to them(28). Thus hermeneutics is concerned with interpretive understanding of the subjective meaning associated with intended action. This is a fundamentally different type of scientific investigation from that of the natural sciences.

It should be noted that the approach in hermeneutics is generally not a matter of attaining the one "correct" interpretation of a particular social action. In fact, there will usually be a choice between several plausible interpretations, some of which may be compatible and some of which may be incompatible. The point is, unlike the natural sciences in which there are (allegedly) processes of verification, in hermeneutics there is no procedure for choosing between alternatives -- one subjective interpretation is, in principle, as acceptable as another interpretation. Thus, one of the continuing topics of debate in hermeneutics is that of its apparent relativism.

Hermeneutics will receive no further attention here. The existence of and developments in hermeneutics as an alternative, oppositional tradition to empiricism can be explored in Outhwaite, Von Wright, and Gadamer(29). It is

sufficient to note at this point that later "post-empiricist" views of science are built upon developments in the "anti-empiricist" tradition of hermeneutics as well as on the crises which, as we shall see, emerged within the empiricist tradition.

"Post-empiricist" views of science represent an attempt to move past or transcend the dichotomy exemplified in empiricist/hermeneutics methodological debates.

(c) Post-Empiricist Views of Science

The claims made by hypothetico-deductive empiricism -- particularly those about the qualities of the knowledge generated by natural science -- are the subject of dispute. In such constructions of science, the qualities of objectivity and rationality depend on the notion of an "open society" and the critical objectifying framework of controlled scientific activity it fosters. A number of recent writers point to the social character of science as an activity, however, and maintain that the confirmation phase (of theory testing) is, like the discovery phase, strongly influenced by personal and group values. They point to the contradiction apparently sustained by advocates of hypothetico-deductive empiricism who recognise the theory-dependence of observations, recognise the theory-laden character of scientific statements, and yet claim the existence of objective criteria (eg. the severity of tests and the logic of validation) for judging between candidate theories. They also seek to establish the social and historical embeddedness of all knowledge.

One writer who argues that the structure of science is strongly influenced, even shaped, by the social structure of the scientific community is Thomas Kuhn(30). Kuhn argues that this social structure is quite different from the idealised "open society" essential to Popper's view of science. Kuhn's central notion is that of paradigm, a "universally recognised scientific achievement which for a time provides model problems and solutions to a community of practitioners"(31). Paradigms serve as frameworks guiding scientists in the normal practice of their activities -- what he calls "normal science", which is "research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice"(32). Particular scientific communities are seen as specialised research traditions, insular in focus and operation, and with a technical language all their own. These communities may be quite small, and communication between such communities may be difficult. As the last quote suggests, the image is of new-generation researchers within a community rapidly advancing to the "cutting edge" of research in their chosen field by "standing on the shoulders" of their predecessors. This takes the form of taking for granted the paradigms which guide normal science -- that give normal science its rules, procedures, instrumentation and standards for what constitutes research problems and acceptable solutions to those problems. But not all science is normal science. From time to time the "puzzles"

which occupy the efforts of most scientists most of the time resist solution under the guiding principles of the extant paradigm. These unresolvable puzzles Kuhn terms "anomalies", and when they become numerous enough to be disquieting, the extant paradigm is judged to be in crisis, and a hunt for new paradigms begins -- ones better able to accommodate the anomalies and bring them to resolution. The process of a paradigm shift (revolutionary science) occurs when an "old" paradigm is discarded for a more functional "world view". Thus science for Kuhn occurs in a series of "fits and starts" -- long periods of normal science punctuated by shorter periods of revolutionary science.

Kuhn's characterisation of science represents a major problem for those like Popper who claim that scientific investigations are or can be free from the particular influences of social and political contexts of scientific work. If Kuhn's perspective is correct, the claim that science offers the means to rationality, objectivity and truth is unfounded. First, the communities of specialised research tradition engaged in normal science are not capable of acting as the wide, critical community of Popper's "open society". Their limited size, specialised technical language, and above all, their presuppositionalist character preclude this. The social structure of science is portrayed by Charlesworth:

An important part of Kuhn's thesis is that the new way of doing science, which emerges after the breakdown of the old paradigms, has to be accepted and endorsed by the scientific community.

What is defined as "science" at any one time is what the scientific community as a whole chooses to accept as science. In this sense, the definition of science that prevails at any one time is the result of tacit negotiation between scientists; it is a social construct or invention just as much as, say, the idea of "marriage" in our society is a social invention. Put in another way, scientists do not perceive nature directly: rather they perceive it through the spectacles provided by the scientific community at any particular time(33).

The strong "pressure to conform" operating within the community structure of science is seen by some almost as a form of oppression. For Smolicz, paradigms in science define legitimacy for community members and support a set of power relations which affect their professional life:

a paradigm thus defines the field of work for succeeding generations of scientists, and determines, for a time at least, which techniques might be employed for their solution. Such adherence to the basic common beliefs creates a climate of unanimity and provides a basis for the exercise by the scientific community of authority over its individual members. Despite the absence of all physical forms of coercion, the moral power of such authority can be so complete that it is seldom fully comprehended by those not engaged in scientific research(34).

Another source of difficulties for the Popperian view of science is the work of Feyerabend. In short, Feyerabend(35) maintains that logic itself is a social product which operates like a paradigm. Logic (and philosophy in general) does not provide (as Popper seems to suggest) an independent point of reference from which the world can be viewed. Thus logic itself operates as a taken-for -granted framework of presuppositions.

That science has a social structure in the sense described by Kuhn seems to preclude a special claim on its

behalf to knowledge that is objective in the sense claimed by empiricists. And further, Kuhn's notion of revolutionary science is a threat to the claim of scientific rationality and truth. For Kuhn, the paradigm shifts of revolutionary science are characterised by paradigm debates in which proponents of competing paradigms attempt to convince members of the scientific community of the value of their candidate paradigms. These debates reduce to persuasion and influence, where communication is never better than partial. In the words of Siegel:

Paradigm debate is so uncommunicative, according to Kuhn, because paradigms are "incommensurable" -- that is, they cannot be judged according to paradigm-neutral criteria of evaluation. Paradigm debate and paradigm choice are, then, not at all like the critical discussion and reasoned argument (to say nothing of the straightforward comparison of predictions with experimental outcomes) that standard philosophy of science makes them out to be. For Kuhn,...paradigm debate and choice is by and large an irrational affair(36).

The "irrationality" of paradigm debates suggests that if Kuhn's thesis is correct there is no reason to assume that a paradigm shift -- the replacement of one paradigm by another -- is an evolutionary process in which the scientific enterprise is engaged in a progressive march toward certainty or, to put the point in a form that Popper might more readily accept, away from uncertainty. The intrusion of values at the point of paradigm debate makes problematic the claim that science represents a rational means of approaching closer and closer to truth, in the manner suggested by advocates of hypothetico-deductive empiricism.

Kuhn's account of science does more than suggest that empiricist views may be mistaken in their description of science; by adopting a sociology of scientific knowledge perspective, it replaces the apparent unassailability of the logic of science perspective with a social and historical perspective which permits a critical examination of how science has actually developed and is actually conducted. If Kuhn's thesis is correct, then the scientific community is at once espousing the qualities of objectivity, rationality and truth while enacting a commitment to a particular set of values embedded in the prevailing paradigm. Through a medium of knowledge generated under the auspices of objectivity, rationality and truth, science imposes a set of social values (those held by the supporters of the dominant paradigm) on the wider society. Though these values appear at first to be linked only to the conduct of science itself (the values of objectivity, rationality and truth-seeking within the paradigm and the particular field of science), they actually have wider implications because, being values about how scientists should conduct themselves in society, they imply a view of the role of scientists in society (hence Popper was moved to write about "The Open Society and its Enemies"), and thus a view about the nature of society itself. From the Kuhnian perspective, (and, it seems, from the perspective of Popper also), there is an ideological element to the operations of science.

The view of science which has emerged in opposition to

the empiricist view, out of the work of a variety of students of science (including Kuhn), has become known as the "post-empiricist view of science". Whereas inductive and hypothetico-deductive formulations of science sought to apply the precision and power of symbolic logic tightly to link knowledge to observations (that is, there was an attempt to invoke logical empiricism as the epistemological base of science), presuppositionalist views of science like Kuhn's rely, "not on an analysis of the logical status of theories, but on detailed historical studies of the process of scientific progress and change"(37). The "post-empiricist" view of science is described by Brown(38).

In contrast to logical empiricism, the outstanding feature of the new approach is a rejection of formal logic as the primary tool for the analysis of science, and its replacement by a reliance on detailed study of the history of science... Most scientific research consists, in this view, of a continuing attempt to interpret nature in terms of a presupposed theoretical framework. This framework plays a fundamental role in determining what problems must be solved and what are to count as solutions to these problems; the most important events in the history of science are revolutions which change the framework. Rather than observations providing the independent data against which we test our theories, fundamental theories play a crucial role in determining what is observed, and the significance of observational data is changed when a scientific revolution takes place. Perhaps the most important theme of the new philosophy of science is its emphasis on continuing research, rather than accepted results, as the core of science. As a result, analysis of the logical structure of completed theories is of much less interest than attempting to understand the rational basis of scientific discovery and theory change.

(c). Conclusion

The inductive view of science as a single, direct, non-presuppositionalist, logical process of generating knowledge from observation was at one time the dominant perspective. Its notion of objective observation became contested: the work of Popper, Hanson, Piaget and others suggested an opposing view to the perspective that the process of knowledge generation is or could be non-presuppositionalist. The message of these challenges is that there is no "logic of discovery" for generating true knowledge from observations, as claimed in the inductive view.

The advocates of hypothetico-deductive empiricism acknowledged that no "logic of discovery" exists, pointing out that observations (and hypotheses) are presuppositionalist. They argue that the rigor of critique of the "open society" together with the power of deductive logic could confer an objectivity and rationality to scientific knowledge.

These ideas also become contested. At the end of the 19th century in particular, empiricist constructions of science were opposed by advocates of the pre-existing alternative intellectual tradition of hermeneutics, an "interpretive science of the human spirit" which, unlike empiricist science, was concerned with articulating the subjective meaning of action. Later, Kuhn's characterisation of science as having a community

structure established the possibility that the scientific community's activities are presuppositionalist, and therefore that the scientific community's critiquing function could not guarantee rationality and objectivity.

If science is understood as an ongoing activity of interpretation of nature through a framework of presuppositions, then it becomes clear that observation can neither generate true knowledge, nor conclusively justify knowledge through the Popperian process of widespread attempts at refutation. The relationship between knowledge and observation becomes seen as a dialectic one: knowledge(personal and community presuppositions) influences what is observed, and how it is observed; and reflection on observation shapes knowledge. Knowledge is seen as historically-located and socially-constructed, since it is influenced by the presuppositions held by the community at a particular point in time; it is permanently provisional. If science and scientific knowledge are understood in this way, then the task of science becomes not one of generating an objective, universally applicable set of theoretical propositions, but the continuing one of attempting to explicate an account of the "theory" (or framework of presuppositions) in terms of which scientific practitioners make their work intelligible. It is in this sense that for a post-empiricist view of science, "analysis of the logical structure of theories is of much less interest than attempting to understand the rational basis of scientific discovery and theory change"(39).

An understanding of these contesting views of science and scientific knowledge (see Table 1) is necessary if a coherent framework for the critique of EE is to be developed. In EE for example, the way "science" is construed determines how "environmental problem-solving" is construed: given an empiricist conception of science, a coherent view of "environmental problem-solving" is one in which environmental problems are seen as being solved through objective applied-science techniques; given a post-empiricist conception of science, a coherent view of environmental problem-solving would entail a search for and appraisal of the values and vested interests at work in proposals for environmental change. In terms of educational practices, the first stresses the need for development of instrumental, technical problem-solving skills; the second stresses the need for social critique.

Further, it is in terms of their epistemological congruence that the coherence of conflicting views of EE, educational innovation, educational research, and education itself is defined and understood. As we shall see, conflicting views of innovation (for example) are informed by different views of the nature of scientific knowledge.

TABLE 1. THE NATURE OF SCIENCE : THREE VIEWS OF KNOWLEDGE & RATIONALITY

	Knowledge	Relationship of Observation & Knowledge	Rationality
(1) <u>EMPIRICIST</u>			
(a) Inductivist	Knowledge is "objective", in the sense of being in principle absolutely independent of the values of agent or situation, and applicable in every situation.	A single inductive, non-presupposition - alist process enables the direct move- ment from observation to knowledge.	Rationality is achieved by, and defined as, the exclusion of human values during the process of moving from observation to knowledge.
(b) Hypothetico - Deductivist	Knowledge is "objective" in the above sense.	Observation is theory-dependent; that is, the "discovery" phase is non-inductive and presuppositionalist. The "confirmation" or justification phase is deductive and non-presuppositionalist.	Rationality is achieved by, and defined as, the exclusion of human values during the process of "confirmation". Rationality is regarded as achievable by conformity to a set of unambiguous methodological rules.
(2) <u>HERMENEUTIC</u>	Knowledge is the interpretive under- standing of subjective meaning of intentional actions : knowledge is subjective and relative, private and individual.	Observations are presuppositionalist, since all actions (including the act of observation) are intentional. There is no procedure for choosing between alternative interpretations of social reality.	Rationality is identified with intersubjective agreement about meanings of actions.
(3) <u>POST-EMPIRICIST</u>	Knowledge is historically-located and socially-constructed. There is a dialectical unity of knowledge and human interest.	The processes of "discovery" and "confirmation" are both presupposition- alist. Science has a community structure. The relationship between observation and knowledge is a dialectical one, in which knowledge influences observation and observation shapes knowledge at all times.	Rationality is achieved by continuing efforts to explicate and understand the socio-historical context of scientific decision-making. Rationality is dialectical, treating the logical coherence between belief and action as permanently problematic.

2.2 The Nature of Innovation

Environmental education is an effort at educational change. It is at least an "innovation", requiring changes in the practice of educational practitioners. It probably also entails educational "reform", since it represents a challenge to existing patterns and structures in institutional education. There are a number of different ways of construing educational change efforts like environmental education. Some of these are more epistemologically congruent with environmental education than others. The contesting perspectives to innovation considered here will be analysed with respect to their implicit epistemology; in particular, the view of natural science which underpins that epistemology will be identified.

(a) The RDDA Perspective

The "Research, Development, Diffusion, Adoption" (RDDA) perspective has probably been dominant in educational innovation over the last decade. House describes Clark and Guba's(40) formulation of the RDDA approach in this way:

New knowledge that served as a basis for development was advanced during the research stage. A solution to the operating problem was invented and built during the development stage. This innovation was introduced to practitioners in the diffusion stage. Finally, the innovation was incorporated into school systems in the adoption stage(41).

Popkewitz's account of the RDDA perspective suggests its importance in the recent scene of educational change:

One of the most important conceptions of change in America has been the centre-to-periphery approach. This approach is most often defined as RDDA: Research is to identify, conceptualise and test ideas; Development is to engineer and package programs for school use; Dissemination is to tell, show and train people about program use; and Adoption is to install programs. The RDDA model and its variations assume that a universal, logical and efficient procedure exists for the definition and organisation of change. It also suggests a neutrality to the change process itself: the problem of change is not to consider the moral or political structure of an institution but to implement a scheme of order, precision and clarity(42).

The RDDA perspective places great importance on the role of curriculum materials in educational change. Consider the development of a "typical" package of curriculum materials by a central development agency. Evaluation in the research and development stages of the process is performed "to ensure a quality product": different sections of the teaching materials may be reviewed by the developers in cooperation with teachers and outside theorists for accuracy and effectiveness in design; revisions are made as necessary during the production stages; once the materials are completed they may be "field-tested" in one or more educational settings -- if several settings are used, an attempt is made to represent different socio-economic conditions; learners may be pre- and post-tested to determine how well the program based on the materials achieved its stated objectives; the instruments used to measure student performance are developed by the researchers; an appropriate statistic is employed to measure for statistically significant shifts in pupil performance in the groups "exposed" to the materials of the program;

pupils may also be asked to express what they liked, disliked and felt should be modified in the materials; teachers of the tested groups of pupils may be asked to fill out a questionnaire dealing with the "useability" and transferability of the materials; in addition, several individuals with expertise in associated fields of theory may be asked to review and critique the materials and program design; the information from the learners, teachers, and consultants is used to make final revisions to the materials. Based upon the total evaluation, the materials are prepared and made available for publication, promotion and distribution to interested "clients" in the formal educational system.

Such is the perceived rigor of the "research" phase of the RDDA approach, that claims of proven effectiveness are made in respect of the materials before they are disseminated for everyday use in a range of school settings(43).

The RDDA approach, then, is predicated on the assumption that a central authority is competent in identifying innovation problems, developing solutions to those problems by drawing upon pre-existing bodies of knowledge and empirical testing of strategies, and disseminating these solutions -- which are thought to have universal applicability -- to "target groups". The initiative in this change process is located firmly with central authorities. The "target groups" are regarded as passive consumers. Further, the contexts in which the

"target groups" are located are regarded as isomorphic at least to the extent that the assumptions and presuppositions providing the "background rules for action" in these contexts are taken for granted. According to Popkewitz(44), the RDDA approach assumes that educational change is related to a search for a universally efficient method to improve schools, and makes inherently social, political and ethical problems of schooling into seemingly neutral administrative changes.

The RDDA perspective on innovation is underpinned by the epistemology of empiricist views of science. Indicators to the epistemology of the RDDA perspective are its conception of rationality as logical efficiency (and even "proven effectiveness"), and its claim to universal applicability of its "solutions" and recommendations. The claim to universal applicability recognises neither a social/political quality of the context of research and development, nor a socio-historical quality of the context in which the "solutions" are to be adopted.

The RDDA perspective is only acceptable to the extent that empiricist conceptions of science are acceptable. Its claim to universal applicability assumes uniformity of educational settings (within a general range, at least). But this uniformity is problematic and cannot be assumed. The confounding effect of non-uniformity of educational settings poses a serious problem for RDDA approaches, as illustrated in House's comments on a major evaluation in the United States:

When confronted by a reporter about the primary findings of overwhelming intersite variation within models, John Evans said the variation was "frustrating" but suggested the answer was "not that the world was crazy or that the sites are radically different", but that the models "weren't uniformly well implemented". "When a sponsor is paid to implement a model", he said, "the sites ought to be relatively homogeneous". The Office of Education would launch an effort to understand "the puzzling wide-site variations"...The idea that the same model in different settings would have different outcomes was apparently not an acceptable conclusion....Otherwise, it would be more difficult for the Office of Education to prescribe particular programs or to decide on the allocation of scarce resources(45).

As a consequence of generalisable outcomes associated with their applied-science epistemology, RDDA approaches are unable to explain the influences of inter-site variability.

(b) Hall's Concerns-Based Adoption Model (CBAM)

Gene Hall and his team at the University of Texas have developed a perspective on innovation which differs in a number of respects from the standard RDDA perspective. Hall's (46)"Concerns-Based Adoption Model"(CBAM) is based on four assumptions, each of which challenges the uniformity assumptions of the RDDA model of innovation (and thus implies a critique of the RDDA approach):

- (i) Change is a process, rather than an event. Change takes time to unfold. This perspective questions, for example, the effectiveness of the rationalistic one- or two-day inservice frequently associated with RDDA

approaches which assumes that a significant change in peoples' ideas will lead to a significant and more or less immediate change in their practices.

(ii) Change is made by individuals. The emphasis in the CBAM is placed upon describing and understanding what happens to the individual, rather than upon group and institutional rules or procedures.

(iii) Change is a personal process. The individual's personal feelings, needs and perceptions need to be monitored and understood in order to facilitate change; it is not a technical-managerial process in which changing practices can be achieved by prescription or command.

(iv) Change entails developmental growth in terms of the individual's feelings about the innovation and skill in using the innovation. There are developmental levels and stages that individuals may progress through as they become increasingly confident and competent in the use of the innovation. It is not a process of simply replacing one set of practices or resources with another in order to achieve changed or improved outcomes.

Two additional assumptions of the CBAM model of change are that an innovation (for example, a new set of curriculum materials, or a new administrative arrangement) is being installed, and that the innovation is appropriate -- that is, that it "is positive and has the potential to

be effective at the implementing site".

Building on the assumption that change involves developmental growth on the part of the teacher, Hall develops the notions of progressive stages of concern and levels of use to describe the changes which he believes all teachers go through when participating in the innovation process.

Stages of Concern

Stages of Concern (SoC) are defined by Hall as "the feelings, perceptions, motivations and attitudinal dynamics of individuals as they first become aware of an innovation, approach use and gradually become increasingly confident in their use of the innovation"(47). According to Hall, seven stages of concern have been identified and their existence "verified through extensive research"; these are presented below.

Definition: STAGES OF CONCERN ABOUT THE INNOVATION

0. AWARENESS: Little concern about or involvement with the innovation is indicated.

1. INFORMATION: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about himself/herself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects, and requirements for use.

2. PERSONAL: Individual is unconcerned about the demands of the innovation, his/her inadequacy to meet those demands, and his/her role with the innovation. This includes analysis of his/her role in relation to the reward structure of the organisation, decision-making and consideration of potential conflicts with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be reflected.

3. MANAGEMENT: Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organisation, managing, scheduling, and time demands are utmost.

4. CONSEQUENCE: Attention focuses on impact of the innovation on students in his/her immediate sphere of influence. The focus is on relevance of the innovation for students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes.

5. COLLABORATION: The focus is on coordination and cooperation with others regarding use of the innovation.

6. REFOCUSING: The focus is on exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternatives to the proposed or existing form of the innovation.

The movement of a teacher through these stages of concern is monitored in three ways: a "loose clinical procedure" entailing a brief conversation, an "open-ended concern statement", and a "more psychometrically rigorous procedure" using a 35-item questionnaire with Likert scale format. The last generates data for computer analysis into "concerns profiles". Hall claims that "there is...a theoretically predictable movement to the concerns profiles of individuals as they are introduced to an innovation and experience the change process -- that is, assuming that the innovation is appropriate and that the change process has been facilitated in effective ways" (48).

Levels of Use

This dimension focuses on the behaviours of individuals as they approach and use the innovation. According to Hall, eight distinct Levels of Use (LoU) have been

identified, each one being "operationally defined", and related to "decision points" which help in distinguishing between the operationally-defined levels. A "focused interview procedure" has been developed to assess the LoU concept. The eight Levels of Use are presented in Table 2.

Innovation Configurations

Another key dimension of the CBAM is the concept of "Innovation Configurations", which refers to the different patterns and forms of the innovation as it is adopted and made operational. The way in which Innovation Configurations are measured provides an insight into the model's perception of the relationship between developer, facilitator and practitioner. In the words of Hall:

The procedure in general begins with a review of the materials and an interview with the innovation developer. Developers are asked to describe the essential features/components and variations of the innovation as they see it. We then visit exemplary sites where the innovation is in use. During this process, a configuration checklist is drafted which identifies the essential components and ways each of the components varies. This draft checklist is refined based upon the observation in the exemplary sites and then the revised version is taken back to the innovation developer for critiquing(49).

The Implicit Epistemology of the C.B.A.M.

One obvious difference between the CBAM and the more straight-forwardly "technological" approach of the RDDA model is the former's heavy emphasis on the individual teacher as a significant factor in the change effort. Far from being taken for granted as in the RDDA model, the teacher is the focus of attention in Hall's model:

teachers' responses to the innovation are regarded as crucial, and it is recognised that the life of the innovation is linked to the development of the teacher.

On the other hand, the model suggests that the process of change in stages of concern and levels of use are known and understood and the same for all teachers. In a sense these stages and levels have taken on a life of their own, and are seen as existing objectively and being capable of universal application. And the normative and ideological appropriateness of the innovation is not subject to critique in applications of this model -- appropriateness is, in fact, assumed. The notion of universal applicability, as in the RDDA perspective, points to an "objectivist" view of knowledge.

A further indicator to the epistemology of the CBAM is the perceived role of the facilitator. According to Hall:

This change facilitator role may be played by a line facilitator or may be the job of an outside process consultant or perhaps a central office staff developer or curriculum specialist. Whatever their official role, in order to be effective they must have particular skills and make appropriate interventions as the change process unfolds(50).

Thus the facilitatory role is seen as being distinct from the normal arena of competence of the practitioner, requiring specialist skills. The facilitator is seen as an external operator with technical expertise in making interventions, conducting interviews and implementing questionnaire surveys, and in statistical analysis. Further, the approach to measurement of innovation

configurations shows that the facilitator is seen as the developer's representative: the approach provides for indirect developer/practitioner communication and allows for some input from the implementer, but the final legitimization of "acceptable" innovation configurations seems to be the prerogative of the facilitator, acting on behalf of the developer:

Before the level of use can be determined, the interviewer must determine if a significant part of the innovation is being used ... It is also the responsibility of the change facilitator to help guide the change process towards the implementation of acceptable configurations of the innovation and to reduce the use of mutant forms that, for whatever reason, have been judged as unacceptable(51).

Given this role of the facilitator, CBAM apparently assumes that practitioners have little control over whether the innovation can be said to be successful in terms of its configurations, and hence assumes that practitioners exert little influence over the educational decision-making (that is, that practitioners' educational judgements are not essential to "decision-makers'" decision-making). In the final analysis, it is the developers and facilitators (on behalf of the developers) who determine whether a particular innovation configuration is "appropriate" or "acceptable" or "successful". The CBAM, then, is similar to the RDDA model in providing a means for "outsiders" to determine the educational values for practitioners. Despite its apparent interest in the concerns of practitioners, the model is actually based on an "objectivist" view of knowledge which converts the "concerns" of practitioners into a

developmental schedule of procedural concerns (rather than substantive or educational concerns), and then arranges a refined technology of interventions aimed at directing practitioners through a "developmental" sequence whose character has been determined by empirical research. The model does not recognise the substantive educational judgements of practitioners, nor does it recognise that its own criteria are based on a view of the relationships between researchers, developers, facilitators and practitioners which is historically-located and socially-constructed. The instrumentation of the model is designed to be sensitive to "individual variables" (the orientation of the model towards the individual is clear in the four distinguishing assumptions of the CBAM), but contextual factors are taken for granted or regarded as unproblematic. As Popkewitz(51) points out, such models create impressions of change, but the background factors are seen as fixed: there is no sense of knowledge as a dialectic between theory and context in the model.

However, Hall does recognise the complexity of the context of implementation, claiming that the change facilitator needs to think systemically because

the user system is made up of many sub-systems and these sub-systems are all interdependent and interactive. The change facilitator needs to constantly keep in mind the gestalt of the user system, realising full well that an intervention on a particular sub-system may have consequences that pop up in another perhaps even remote sub-system(53).

(c) The Coaching Approach

The RDDA approach to educational change is objectivist, systems-oriented, yet individualist in that it treats practitioners as passive receivers in no need of collaborative interaction with other practitioners in bringing about change. Hall's CBAM model appears revolutionary at first glance, but on closer inspection can be seen to retain the objectivist assumptions of the RDDA approach, and can, in fact, be regarded as an amplification of the "Adoption" phase of "Research, Development, Diffusion and Adoption". The characteristic that distinguishes the "coaching" approach from both the RDDA and CBAM models is the attention it gives to the interaction between collaborating practitioners.

The claim to have identified "training procedures that virtually guarantee the successful implementation of almost any (teaching) approach" suggests an important perspective on innovation. Such a claim is made by Joyce & Showers(54) about an approach described by them in a series of recent papers(55).

The Joyce & Showers model of educational change suggests that a four-component process of careful presentation of theory, modelling, intensive practice, and structured feedback enables teachers to acquire targeted knowledge, skills and attitudes.

The first component involves study of the theoretical

basis or rationale of the desired teaching method(56). The presentation of theory is seen as providing a knowledge base in terms of a conceptual framework, rationale and verbal description of the dsired teaching method. This theory may be presented in the form of readings, lectures, films, and discussions.

Modelling or demonstration takes the form of observation of demonstration lessons conducted by persons considered relatively expert in the desired teaching roach. This enactment of preferred teaching approaches may be achieved through live demonstrations with children or through the use of media.

The next component is practice under simulated conditions. This involves trialling the new approaches by practising either with peers or with small groups of children under fairly controlled circumstances -- at best in the sense that the management of an entire class at the same time is not required.

The last component of the Joyce & Showers model is structured feedback. This is to provide the opportunity for the teachers to observe their own teaching and to reflect on those observations. Feedback may be self-administered, given by peers, or provided by coaches. Joyce & Showers make much of the importance of coaching, drawing an analogy with the improvement of skills in members of college football teams(57). The functions of coaching are to provide companionship, assistance in

learning to teach appropriate responses to students, figuring out the optimal uses of the desired model, and provision of ideas and feedback.

The Joyce & Showers conception of educational change appears to be a more complex, humanitarian one than any of the preceding two (RDDA and CBAM). It recognises that there are important differences between different teaching contexts:

the conditions of the classroom are different from training situations: one cannot simply walk from the training session into the classroom with the skill completely ready for use -- it has to be changed to fit the classroom conditions.

It also recognises that habitual existing teaching patterns may not be compatible with the desired teaching approach:

to confound things somewhat further, teaching behaviours that have worked well in an existing repertoire may actually impede the use of new models of teaching(58).

It is also clear that their model supports the notion of collaborative work among teachers towards change and improvement:

Ideally 'coaching teams' are developed during the training process. If we had our way, all school faculties would be divided into coaching teams who regularly observe one another's teaching and provide helpful immediate feedback...In short, we recommend the development of a 'coaching environment' in which all personnel see themselves as one another's coaches(59).

However while the third and fourth components of Joyce & Showers' model embraces the notions of feedback on

practice and collaborative work, the first and second components are, like the RDDA and CBAM conceptions of educational change, informed by an objectivist view of knowledge. The model speaks of a knowledge or theory base which is "provided" to the teacher in the interests of bringing about change. This knowledge, then, exists a priori, independently of the teacher's context of work, is applicable to all such contexts, and is in principle applicable in the absence of reflection on practice ("each component was found to contribute to improvement, but when used together each component had greater power than when used alone"⁶⁰). The "expert practitioner" notion of the second component encourages the adoption by teachers of the practice of others without reflection on the relationship of that practice to teachers' own, pre-existing theories.

Overall, the model sustains an objectivist view of knowledge in its conception of educational change by stressing the importance of "introduced" bodies of knowledge in the absence of engaging practitioners in reflection on the relationship between that introduced knowledge (component 1), preferred practice (component 2) and teachers' own theories. The reflection encouraged in components 3 and 4 is on the relationship between existing practice and preferred practice, with a view to replacing one with the other, rather than on the teachers' own theories in terms of which existing practice is made intelligible. As a result, the only theory considered explicitly (that introduced in component 1) is treated as

beyond scrutiny in that it is introduced to teachers in a presentation format (in which teachers are regarded as consumers of knowledge, not as critics in a theorising process) and is not seen as needing to be understood (to be regarded as problematic) in the light of the assumptions about teaching and the context of work woven into the teachers' pre-existing theories. The introduced theory is seen as being effective in bringing about change in a way that is independent of the social and historical setting of that change. Reflection, when it is introduced (in the envisaged "coaching teams"), concerns bringing practice into line with theory; there is no expectation that the theory itself will be changed through this reflection.

(d) A Liberal/Political View of Educational Change

Each of the views on innovation considered (RDDA, CBAM, and "coaching") is informed by an objectivist epistemology. Each of these perspectives creates the impression that educational change is a neutral process -- none of the three perspectives portrays change as conditioned by political concerns.

It is the assumption that educational life is indeed political that distinguishes Ernest House's perspective on innovation from the RDDA, CBAM, and "coaching" models -- as indicated by the title of his major publication The Politics of Educational Innovation (61). In this book, House portrays innovation as being dependent on, or

influenced by

- * face-to-face personal contacts;
- * entrepreneurship (an advocate working within the system);
- * the political nature of the social life of schools.

(i) Face-to-face contact between operatives in the diffusion process is seen as essential because it permits a "fully-fledged information exchange and the full exercise of personal and social influence"(62). So strong is House's belief in the important role of face-to-face contact that he suggests that a prior tracing of personal contacts of agents in diffusion would enable the prediction of the "likely course of the innovation".

If Gene Hall's emphasis on "Levels of Use" and "Stages of Concern" can be thought of as an amplification of the "Adoption" phase of "Research, Development, Diffusion, Adoption" (RDDA), then House's emphasis on face-to-face contact could be thought of as an amplification of the "Diffusion" phase:

Direct personal contacts are the medium through which innovations must flow. Innovation diffusion is directly proportional to the number, frequency, depth, and duration of such contacts. Networks of personal contacts are not random. They are highly predictable and stable, strongly structured by the hierarchical nature of organisation and the nature of urbanisation. The influence of these forces on innovation diffusion in education is profound(63).

However, as we shall see, there are definite departures from the RDDA model in House's conception of innovation.

(ii) The educational entrepreneur. In House's view,

schools -- the ultimate destination of innovations -- possess a rigid internal structure, which presents a range of filters and obstacles to the passage of innovations. Educational entrepreneurship -- an advocate working within the system -- is required if the effects of this structure are to be overcome. The dependence of an innovation on continuing entrepreneurship is illustrated by House:

One example would be a situation where an ambitious young principal, taken with the idea of the "open classroom", selects teachers to work with him, organises them, and sets the whole school off on a path toward open education. He solicits extra funds from the central office, brings in outside consultants, and begins in-service training. There is talk in the lounge. An ideology develops -- the school's own version of "open" education. There is a new excitement. Teachers try different things, and younger teachers who are involved go to special conferences. Older teachers are, however, suspicious. As the ingroup feeling increases, certain hostilities surface, but the advocacy dominates. Other teachers who visit the school can see the excitement! Newspaper articles are written, the principal becomes a central figure among other principals, and other schools try open education. Then the principal, who planned to install open education in the whole district, is promoted to assistant superintendent, and he leaves the school. When his assistant is promoted to principal, things level off. It is just not the same. As enthusiasm diminishes, some people go to graduate school, and some get married. The innovation wave has passed; advocacy is over(64).

While the entrepreneur may be a parent or a teacher, it is more usual for him or her to be an administrator, with career advancement being the most likely motivation.

(iii) A view of educational life as political is crucial to House's perspective on innovation. Whereas in the RDDA model innovation problems are seen as technical inefficiencies, they are seen by House as personal

conflicts and compromises among factional groups. This "political" perspective assumes the existence of value conflicts (different "views of the world" in respect of curriculum and classroom practice) between various participants in the innovation, the need for opposing factions to bargain and compromise, and the probability that compromise can ultimately be achieved successfully. House uses "politics" in his view of educational change to refer to

the interaction, interests, and rivalry of factional groups whether they exist in the school, the region, the state, or the nation, especially as the groups compete for resources an attempt to influence and control each other and their own members(65).

House's perspective at times has technicist undertones -- for example with the idea of an innovation as a diffusible entity championed by an "outside agent" (to the school):

When a career-bound superintendent, through his personal contacts, decides to introduce an innovation into his school district, that is only the first step. Then comes the hurdle of the central office itself, which is followed by efforts to persuade teachers to utilize the innovation. Persuading teachers is by far the most difficult task, for, over the short and medium term, the success of the innovation will depend on whether an enthusiastic "advocacy" develops around it(66).

Also embedded in this quotation are notions of central involvement in the change effort prior to teacher involvement, and "persuasion" of teachers to adopt the innovation. However he is careful to dissociate his view of innovation from that of the "classical" RDDA model: in particular he rejects the notion of a school as a unified

collection of passive individuals and groups of schools as unified rational entities. Rather, he sees schools and groups of schools as coalitions that sometimes cooperate but more usually compete with each other. Later(67), House engages in a critique of government RDDA approaches under the heading of "The Doctrine of Transferability" -- a reference to the depersonalised, technicist orientation of centre-periphery models which he wishes to reject.

While House's view points to the political nature of educational change, and stresses the need for personal contact and the inevitability of personal conflicts and compromises among factional groups, it is political rather than politicised. His view of innovation preserves the notion of externally-mediated change -- his message is that change agents ought to take into account such things as the competition between groups for resources. His view is liberal/political in that while he recognises that educational life itself is political, he portrays the problems that may arise as being susceptible to solution through the actions of individuals making wise and rational compromises. His description gives no account of how social forces operate to structure certain responses, nor of how collaborative (rather than individualist) action is required to overcome structured practices and pressures if educational change is to take place.

(e) Educational Change as Ideology

A different view of knowledge informs Thomas

Popkewitz's conception of educational change. Popkewitz and others(68) studied a reform program (Individually Guided Education) aimed at introducing a management system for individualising instruction in American elementary schools. The study was conducted in six schools. According to Popkewitz, three patterns emerged from the study, with "different assumptions and implications for the work and knowledge of schooling", the understanding of which requires a consideration of the "social predicaments of schooling". The "social predicaments of schooling" are social concerns and issues that arise concretely in the settings in which schooling occurs: issues arising for a society that is "increasingly differentiated in occupational skills, cultural sensitivities and social awareness", and in relation to the school traditions and histories in terms of which the schooling is given coherence and reasonableness(69). For Popkewitz, "the behaviour, language and beliefs that characterise the classrooms of the schools ... were related to larger social contradictions, tensions and historical conditions which filtered into classroom practices"(70).

The perceptions of Popkewitz and his associates regarding the inextricable relationship between the educational values and practices of schooling (and of change efforts in educational contexts) on the one hand and the social, historical and political values of wider society on the other is exemplified in the following selection of quotations(71):

The patterns of school conduct are always rooted in assumptions about the nature of society, of individuality and of the relation of the individual to that society: embedded in pedagogy are theories of cognition, society and polity(p.11).

Schooling is a socially constructed endeavour. To participate in the world of schooling is to participate in a social world which maintains particular lines of reasoning, action and values. Underlying the organisation of classrooms, teacher behaviours and standards of pupil achievement are dispositions towards how one is to talk, think, 'see' and act in the world. The dispositional quality of schooling is often ignored in research but is fundamental to a consideration of the significance of institutional life(p.9).

The conditions of stability contain underlying rules and interpretive schemes that give form to schooling. The 'rules of the game' emerge from both the historical traditions of schooling and the larger socio-cultural interests that impinge on our definitions of schooling. The problem of change is one that exists within those contexts in which people contest the priorities and values of the existing situations, engaging in collective actions that challenge and modify the situations of schooling(p.25).

Schools are socially constructed, sustained, and renewed through the actions of people. These constructions are never neutral: schooling is an imposition of certain patterns of social conditions from the array of those possible at any one time(p.26).

A number of points about the relationship of schooling and society allegedly supported by the studies reported by Popkewitz emerge from these quotations:

- * schooling and thereby "school knowledge" and educational change are socially constructed and historically located;
- * schooling is disposed towards, and serves to reproduce, certain ways of thinking and acting that are meaningful to and valued in the wider society: institutional schooling embodies and can be understood

in terms of social and political theories which it "enacts";

* to understand schooling, and the problem of change, one needs to understand the contestation that goes on in educational contexts about priorities given to competing political theories.

Popkewitz expands the notion of the contextual nature of schooling by describing three such contexts (72):

- (a) a pedagogical context, which includes the daily practices and discourse of classroom life and the patterns of this activity which produce conceptions of school work and knowledge (for example, knowledge as based on authority);
- (b) an occupational context of teaching, which refers to the teaching occupation as a social community which maintains ideologies and mechanisms of legitimacy (for example, teaching as a profession);
- (c) a social/cultural context, which refers to the community in which schools are located; discussions of this context treat the manner in which a community's social/cultural and economic orientations, sensibilities, and awarenesses affect school practices (for example, schooling as a preparation for citizenship and work).

By drawing attention to the embeddedness of educational change in the greater social and political context, Popkewitz points to the ideological character of schooling: he claims that beneath the surface layers of teaching and curriculum practice and structures, there are

underlying principles of legitimacy, authority and social order(73).

Popkewitz's perspective on educational change is based on a different view of knowledge to the preceding four perspectives (RDDA, CBAM, "coaching" and liberal/political). His view of schooling as an ideological enterprise serving social and political interests is not based on a view of knowledge as objective and rational in the empiricist sense considered in section 2.1. -- and this demarcates his perspective from RDDA, CBAM and "coaching". A post-empiricist epistemology informs his perspective: in his view, knowledge about schooling and about educational change can only be understood when seen in relation to the "social predicaments of schooling" -- knowledge is to be seen as socially-constructed and historically-located. According to Popkewitz, knowledge about schools and educational change cannot be viewed as being free from ideology by virtue of the method of its generation; all such knowledge contains value judgements about what schools and society ought to be like. To view knowledge uncritically -- to view it as instrumental and directly useful rather than ideological -- "filters out attention to the social, political and historical complexity of schooling and works as an element of conservatism"(74), in fact acting as a negative force against educational change.

Another distinguishing characteristic of Popkewitz's conception of change is his dialectical view of reform as

tension between change and stability. For Popkewitz, many change efforts actually serve to reinforce the stabilising patterns and structures of schooling. In many cases, this process is aided and abetted by the "slogan system"(75):

The irony of many educational reforms is that the program that is intended to challenge institutional characteristics is transformed so that it transforms existing beliefs and patterns(76). The legitimising function of reform can be understood by focusing on the nature of slogan systems. To talk about individualisation, discovery approaches or participation is to provide a symbol that condenses a variety of emotions and values into a single word or set of words. A slogan (for example 'individualisation') works in education in a manner similar to the function of a slogan in the political world. A word such as democracy or national security provides a way of symbolising the values and aspirations of a group. Slogans, however, do not tell us what is actually proposed. In some cases, the slogan obscures the concrete actions and motives of the people involved. For example, federal medical insurance in America may provide greater benefits to the doctors that participate than to the poor that are publically its beneficiaries. Reform in this instance produces an aura of change that enhances the position of those who give direction to and gain from the existing organisation of social affairs. Reform can be a symbolic act that conserves rather than changes.

Here, Popkewitz argues that the issue of change and stability involves deeply embedded social interests, some of which may be hidden from scrutiny. For Popkewitz, to address the dialectic of change and stability requires "collective action in which dominating interests are confronted"(77). It is this view of educational change as requiring "collective action" against structured ideological forces that demarcates Popkewitz's perspective from House's liberal/political perspective, in which change is seen as an individualistic endeavour.

(f) Conclusion

When the RDDA, CBAM, "coaching", liberal/political and ideological perspectives on innovation are juxtaposed (see Table 3), differences in their epistemology can be recognised. The RDDA, CBAM and "coaching" perspectives can be seen to share an empiricist view of knowledge, which separates facts from values and knowledge from action: in the RDDA and CBAM perspectives, the educational context or setting of change is regarded as inevitable and fixed, free of factors that can or ought to be taken into consideration when instituting change; in the "coaching" perspective, change is seen as a process aided by acceptance of universally-applicable theory (while educational contexts are seen as social settings, theory is not seen as context-bound). Thus, in these three perspectives on change, inter-context differences are not seen as significant problems for the universal application of the theory of an innovation: these perspectives can be termed "technicist" views of change.

The liberal/political perspective sees the educational setting as political, rather than as fixed or simply social. It recognises the relevance of the values of the setting -- of conflicts and compromises -- and proposes that individual action based on an understanding of the political character of educational contexts will enable the institutionalisation of the externally-originating innovation. Its view of knowledge, then, is not empiricist. Its recognition of subjective,

context-dependent political factors is closer to hermeneutic epistemology, though House, in particular, appears to derive his "political" perspective from studies that focus on dissemination of innovations" -- studies which embrace a technicist conception of innovations as external bodies of knowledge.

The ideological perspective of Popkewitz holds as crucial to the rationality of change efforts the understanding and engaging of historical and social constructions of the context of change. While the RDDA perspective treats the practitioner as a passive implementer-technician, and House's perspective though political remains liberal and individualist, according to Popkewitz's perspective, practitioners must participate collectively in making problematic "the necessity of their social situations" if the conditions for change are to be created. The ideological perspective to innovation adopts a post-empiricist epistemology, and only that epistemology entails a search for, and defines change as collective action in challenge of, ideological interests embedded in institutional schooling. The technicist perspective (RDDA, CBAM and "coaching"), whose empiricist view of knowledge is apolitical, the liberal/political perspective, whose view of change is individualist, and Popkewitz's ideological perspective represent three different positions on educational change.

We are now in a position not only to distinguish between different perspectives on innovation on the basis

of their epistemology, but also to comment on their coherence with environmental education. That is, an understanding of the view of scientific knowledge informing contesting perspectives on change enables their respective epistemological congruence with environmental education to be determined. The same approach will be taken in respect of "educational research" and "education" itself.

TABLE 3 : THREE PERSPECTIVES ON INNOVATION

	View of Knowledge	View of Practitioner	View of Educational Context	View of Educational Change
(1) <u>TECHNICIST</u>				
(a) RDDA	Objectivist and empiricist	A philosophically-passive receiver of the innovation. An implementor-technician.	Inevitable and fixed : inter-context differences do not preclude attempts at universal application of the innovation.	Change is an event achievable through a rational process of materials development and diffusion.
(b) CBAM	Objectivist and empiricist	Undergoes a predictable sequence of changes in concerns about and use of the innovation.	Inevitable and fixed : the normative appropriateness of institutional structures is not an issue.	Change is a process achievable through increased understanding of practitioners' concerns and behaviour when interacting with the innovation.
(c) "COACHING"	Objectivist : preserves the notion of uncritical acceptance of universally applicable theory (i.e. theory is not context-bound).	An active evaluation of personal practice - both individually & collaboratively - comparing own practice with a given theoretical rational.	The educational content is a social setting. Inter-context differences are regarded as significant.	Change is a process aided by acceptance of a body of theory, and by collaborative reflection on practice in the light of this theory.
(2) <u>LIBERAL/ POLITICAL</u>	Subjectivist : the innovation is shaped during diffusion by political contests (conflicts & compromises)	Individuals or coalitions of individuals active in conflicts and compromises - sometimes co-operating but usually competing.	Educational life is seen as political : there are conflicts and compromises among factional groups. The context is seen as presenting a range of filters & obstacles to the passage of innovations.	Change is an externally-mediated process in which an entrepreneur shepherds an innovation through the maze of political obstacles it confronts.
(3) <u>IDEOLOGICAL</u>	Post-empiricist : knowledge is seen as socially constructed & historically - located, rationality is understood dialectically.	Is a professional engaged in making problematic the necessity of the social setting or context of education.	The educational context is constructed historically, socially and in light of human interests.	Change is a process in which practitioners participate in critical analysis & contestation in relation to social, educational & political priorities, values, practices & interests of the existing situation.

2.3 The Nature of Educational Research and Evaluation

It is inevitable that an educational reform effort like environmental education gives rise to a range of educational problems. For example, environmental education as an innovation in educational practices gives rise to pedagogical problems to do with the investigation of controversial environmental issues; environmental education as a reform in education poses problems ranging from a clash with conventional disciplinary structures in schools to redefinition of teacher professionalism. It is the purpose of educational research to engage such educational problems.

There are a number of approaches to educational research -- some of which are more coherent with the special problems of environmental education than others. A framework for critique of environmental education would be incomplete without addressing the issue of coherence in educational research.

The intention in this section is to consider three different and competing intellectual traditions in educational research and evaluation. The three traditions or approaches considered here are the positivist, the interpretive, and the critical. Each of these approaches will be treated as paradigms based on different presuppositions about schooling, society, and the social context of schooling. As in the consideration of innovation perspectives (section 2.2), an attempt will be

made to explicate these presuppositions, and in particular to comment on the extent to which each of these three approaches accepts or challenges the notion of the applicability of a "natural science" epistemology in educational research and evaluation.

(a) The Positivist Approach to Educational Research and Evaluation

There is a variety of approaches to educational research and evaluation that could be called positivist. Some of the key contributors to these approaches are Tyler(78), Campbell and Stanley(79), and Cronbach(80). Hamilton(81) discusses the similarities and differences of these approaches from an historical perspective in a paper entitled "Making sense of curriculum evaluation: continuities and discontinuities in an educational idea".

The term "Positivist" will be used here to qualify those approaches which are typically used to determine the effectiveness of an educational program. In such approaches, congruence between goals and outcomes is measured quantitatively and presented as an indicator of program effectiveness. The evaluation design is one in which learners are pre-tested and post-tested, and attempts are made to identify and control most of the variables in the setting; the effect of the changed activity in a program, "new" teaching style, or "new" program in achieving the program's objectives is determined. The instruments used to measure student performance are developed by the researchers; an

appropriate statistic is employed to measure for statistically significant shifts in student performance in the groups "exposed" to the materials or activities of the program. The emphasis in positivist approaches is on determination of the relative efficiency of candidate activities (or programs) in achieving a pre-determined set of goals: the normative appropriateness of the goals is not an issue. Goals are assumed to be an a priori aspect of the particular educational context.

Consider an example of a positivist approach to evaluation. Bennett(82) conducted an evaluation of a model "state studies" course in the state of Maine, U.S.A. The course was made up of a 300-page textbook and 500-page teachers' guide and included learning activities, text materials, and teaching strategies. The model course was tested in twenty-six different and widely geographically disparate schools in the state. The course was taught as part of the normal school curriculum over a nine-week period. Bennett describes the evaluation design:

To evaluate the effectiveness of the curriculum related to the program's major objective (student achievement in the area of social studies understandings and skills) a pretest and posttest control group design was utilised. A pre-post test was administered before and after the end of a nine-week version of the course. Tests were administered by regular classroom teachers who had received instructions in the pilot testing workshop. Of the 26 school districts participating in the data collection, eight schools were included in the control group and 15 in the the experimental group... Control groups were regular school classes which differed only from experimental groups in that they did not receive the state studies course until a later time. The control groups were pre-post tested at the same times experimental groups were tested... The achievement of the students was evaluated by

a 50-item objective test based upon the instructional objectives developed for the model state studies course. The test covered general, nationally accepted social studies skills, concepts and understandings(83).

The paper also provided evidence of impact, evidence of the reliability of the effects, evidence that the effects are educationally meaningful, evidence that the effects are attributable to the intervention, and evidence of generalisation to other populations. On the last point, the author claims that "the wide testing under diverse circumstances provides a strong measure of assurance that the effects will be generalisable to other junior high populations". Here, Bennett seems to be adopting the role of an "experimental administrator" -- one advocated by Campbell(84) in preference to the role of "trapped administrator":

Trapped administrators have so committed themselves in advance to the efficacy of the reform that they cannot afford honest evaluation ... Experimental administrators have justified the reform on the basis of the importance of the problem, not the certainty of the answer, and are committed to going on to other potential solutions if the first one tried fails.

For Campbell, the United States in 1969 was ready for such an experimental approach to educational reform, an approach in which

we learn whether or not these programs are effective, and in which we retain, imitate, modify, or discard on the basis of apparent effectiveness on the multiple imperfect criteria available(85).

As Bennett's evaluation report exemplifies, positivistic approaches are applied science in nature, and

assume that curriculum design or change is an essentially scientific and value-free enterprise. The enterprise is scientific in the sense that it seeks to determine the effectiveness of the program empirically and objectively. The enterprise is thought to be value-free by virtue of the rigor of its scientific (controlled pre-post test) design. The belief that the enterprise is value-free is shown by the claim that the determination is generalisable -- the established outcomes of the program are thought to be independent of the characteristics of the site of the program's implementation (once a program is "proven effective", this assumption applies as much for Campbell's "experimental administrator" as it does for his "trapped administrator").

Characteristics of Positivist Approaches

(i) Empiricism

Positivistic approaches share a basically applied science approach to educational research and evaluation, seeking to apply the methods of natural science to the problems of education. However the key distinguishing characteristic of positivistic approaches is not a scientific quality but a scientistic one. It is the highly chauvinistic regard in which such approaches hold their empiricist quality.

The strong empiricist quality of positivism comes through in the "main features of the positivistic view" listed by Codd(86):

1. Direct observation of perceived things and processes provides the ultimate link between scientific knowledge of the world and the world itself
2. The reality of the world of which we have knowledge is independent of the researcher.
3. There are observational terms which are themselves theory-independent units of meaning.
4. The actual practice of science -- involving the process of justification, the testing and validation of theories and hypotheses -- is a rational process.
5. Scientific knowledge is cumulative and progressive.

The chauvinistic character of positivism emerges in the view that the only way to be rational is to be empiricist. A number of writers point to this key distinguishing characteristic of positivism. According to Carr and Kemmis, positivism refers to a general attitude or style of thought that is informed by certain assumptions about the nature of knowledge -- in particular, the assumption "that valid knowledge can only be established by reference to that which is manifested in experience"(87). Codd cites as a positivist claim that "the scientific method is the only rational avenue to valid (and certain) knowledge"(88). For Gadamer(89), the positivist perspective "raises the claim that on the basis of its methodological procedure (science) is the only certain experience, hence the only mode of knowing in which each and every experience is rendered truly legitimate". Put simply, the positivist position is that for educational research to count as research at all, it must be informed by the same empiricist view of knowledge that informs traditional natural science.

There are a number of corollaries to this position. Positivistic educational research assumes that educational contexts, like natural (biophysical) systems, contain law-like generalisations which are in principle discoverable, and which can be identified and manipulated just like the "objects" or "phenomena" of the natural world. Like natural ecosystems in the biological world, the social world of the school or classroom is seen as systems of distinct empirical variables, and the task of an educational science is seen as one of identifying those variables associated with desirable social behaviour(90). Associated with this "system of variables" perspective is a shift in definition of "empirical" away from "concerned with actual events discernable directly through the senses or their extensions" towards "that which is quantifiable"; this shift in turn legitimates an emphasis on problems of procedural and statistical rigor.

(ii) Values Freedom

Positivst approaches sustain a distinction between facts and values. The emphasis of positivism upon the empirical -- on the possibility of testing through recourse to sense data -- devalues that which cannot be tested. Since scientific knowledge is thought to be generated through a process of rigorous empirical testing, within an "open society" or critical community, of propositions which are in principle capable of refutation, it follows that propositions which are not susceptible to

empirical test cannot be scientifically confirmed. From a positivistic perspective, then, valuative elements such as the metaphysical, normative and ideological cannot attain the status of legitimate knowledge(91). In the words of Skolimowski, "this (empiricist) position separates values from knowledge and by ruling that values are not proper knowledge, it ipso facto establishes the primacy of knowledge over values"(92). In positivistic approaches to educational research and evaluation, this means that the normative or ideological appropriateness of the goals of educational programs escapes scrutiny and critique.

(iii) Control

In a discussion of the "conventional rationality" of school health education, Beckett states:

In school health education research and development, as elsewhere, the positivistic approach aspires to the objectivity, neutrality, and predictive power of the natural sciences. In this view, the ultimate aim is to understand, explain, predict and control health-related behaviour in the same way that natural scientists objectify and control the natural environment"(93).

This quotation raises the issue in educational research and evaluation of the capacity of positivistic applications for control of participants and events in the educational context. "Control" in this sense applies at two levels: (a) control in experimentation, and (b) managerial/technical control in relation to social life in general. To understand the prediction and control capacities of positivistic approaches, one needs to

consider the relationship between scientific method and scientific explanation (94).

The empiricist conception of the scientific method was summarised in section 2.1 as the rigorous empirical testing of falsifiable propositions. In this method, propositions are expressed as hypothetical universal laws from which one can make testable deductions; these deductions are then tested empirically -- that is by recourse to experience or experiment. Carr and Kemmis illustrate this three-step process as follows:

- | | | |
|--|---------------------------|--|
| 1. Proposal of Hypothesis | All A's are B's | All metals expand when heated. |
| 2. Deduction from Hypothesis | If all A's are B's then C | If all metals expand when heated then iron will expand when heated |
| 3. Assessing deduction by observation on experiment. | C or not C | Experiment to find whether iron does or does not expand when heated. |

A scientific explanation, one based on the application of the scientific method, is structurally similar to the

form of that method. A scientific explanation may be divided into two parts -- an explanandum which refers to the event to be explained and an explanans which contains the information explaining its occurrence. The explanans must contain at least one general law (like the universal law "All metals expand when heated") which, together with some particular information of "initial conditions" (like "iron is a metal"; "heat is applied"), deductively entail the explanandum event ("iron expands when heated"). The explanandum event can only be "explained" in the presence of an empirically verified or at least well-confirmed universal hypothesis from which it can be deduced. In short, to "explain" something is to show that it can be subsumed under a general law: the explanandum event is explained by showing how the empirical regularities expressed by the universal law logically entail that wherever certain conditions prevail, an event (of the explanandum type) will follow(95).

Now it follows from this view of scientific explanation that if the universal empirically-tested law, and the "initial conditions" are true (that is, it is the case that all metals expand when heated, and that iron is a metal and heat is being applied) then if the explanandum event (iron expands when heated) is not known to have occurred, its occurrence could have been predicted by deduction from the explanans. The same universal covering law used to explain a phenomenon can, given certain conditions, also be used to predict the occurrence of the phenomenon. "In this sense, the knowledge provided in any

adequate explanation of an event that has occurred, could, in principle also have served to predict the event before it actually happened"(96).

This brings us back to the message in the quotation from Beckett about the capacity of positivistic applications in research for control of participants and events. In the words again of Carr and Kemmis(97):

precisely because scientific explanations of educational processes provide the knowledge required to predict their occurrence, educational theory, conceived as a body of scientific knowledge, thereby provides the opportunity for their practical control. Just as natural scientific knowledge can be used to predict, and hence control, events in the natural world, so educational theory can use objectively validated causal laws to predict the outcomes of different possible courses of practical action. Travers' textbook on educational research reveals this stance very clearly: educational research, he says,

"is an activity directed towards the development of an organised body of scientific knowledge...which reveals laws of behaviour that can be used to make predictions and control events within educational situations"(98).

Thus the structure of scientific explanations, and their very predictive power, lay the foundation for the technical manipulation and control of educational situations. The application of positivistic thinking in educational research and evaluation, while ostensibly providing the means for improving educational programs (this is the perceived great advantage of technical approaches), also establishes the conditions for technical control of participants and events in the educational setting.

(iv) The Passive Practitioner

Positivistic approaches to educational research and evaluation "disempower" teachers. Since such approaches equate competence in research and evaluation with expertise in the application of empiricist methods -- and in particular with expertise in statistical analysis -- the practitioner tends to be relegated to a position of technician in carrying out the "treatment" as requested by the "outside expert" researcher or evaluator. That is, a marked division of labour exists, with the teacher excluded from the research design and analysis of "results". For example, in a recent evaluation of an energy education program for young children in Alabama, United States, the structure of the evaluation was such that:

a statistician was consulted relating to test format, construct validity, and scoring. Once the teachers of the children developed the concepts deemed important, they did not participate in construction of individual test items...Graduate students enrolled in the Department of Human Development and Family Life, and enrolled in a course in assessment and evaluation of young children were trained to administer the test(99).

This division of labour, and view of professional role of the practitioner as competent technician, institutionalises a situation where practitioners are excluded from the educational decision-making which actually determines their professional lives. In positivistic approaches to educational research and evaluation,

the role of the teacher is to conform passively

to the practical recommendations of educational theorists and researchers. In consequence, teachers need not be regarded as professionally responsible for making educational decisions and judgements but only for the efficiency with which they implement the decisions already made by educational theorists on the basis of their scientifically-accurate knowledge"(100).

(v) Bureaucratic Appeal: the link of positivistic approaches with society at large

The comments to follow serve as a summary of the account of positivistic approaches given in this section. We have briefly considered some of the characteristics of a positivistic approach to educational research. In short, these characteristics are that it:

- (i) is empiricist: the only valid knowledge is experiential knowledge; the only valid route to knowledge is one based on empiricist conceptions of natural science;
- (ii) is value-free: values are separable from facts, and values are not legitimate knowledge;
- (iii) sets the conditions for technical control of participants and events in educational settings;
- (iv) treats practitioner professionalism as technical competence.

The dependence of positivistic approaches to educational research and evaluation on empirical testing results in applicability being limited to only those cases where educational outcomes can be measured or quantified. Other educational outcomes are necessarily taken for granted, ignored, or regarded as unproblematic. Further,

since the inability of valuative elements to be empirically tested places them outside the scrutiny of positivistic approaches, the normative and ideological appropriateness of educational objectives cannot be determined using a positivistic approach. That is, while the fidelity between intentions and outcomes can be determined, the intentions themselves are beyond critique from within the positivistic approach -- and the individuals and institutions responsible for establishing the intentions are similarly beyond critique.

The "value-free" characteristic of positivism gives rise to some problems in educational applications. While it seems clear that value-laden issues ought to lie outside the competence of positivism, it is also apparent that researchers experience difficulty in ensuring that values are eliminated or controlled in their work. Consequently, the rise of positivistic thinking in educational research and evaluation has been paralleled by a rise in application of statistical techniques. In the interests of "rigorous experimental analysis", pre-ordinate designs(101) with "control" and "experimental" groups, "identical" treatments, and measuring "instruments" are in common use. Designs are pre-ordinate because to implement an experiment rigorously, it is necessary to identify the potential confounding factors before the experiment is actually initiated; otherwise, the data required for implementation of the statistics would be lacking. "Instruments" are used in an attempt to improve inter-observer reliability --

that is, to reduce the subjectivity of human observation. Objectivity as agreement between observers is critically important in a process that purports to be empirical and value-free -- and is seen as being achievable through the use of externalised, specified procedures for observation.

As pointed out in (iii) above, an approach based on the scientific method and invoking scientific explanations is regarded as capable of predicting events and thereby exerting control over events and participants. This capacity for control is aided by the created impression that only individuals with training and expertise in science-based research methodology can be involved in determining the relative efficiency of educational programs; that is, the locus of control is external to the participants in the program. And the incompetence of positivistic approaches to determine the appropriateness of normative and ideological assumptions of the program (as expressed, for example, in the type of objectives written for the program) tends to act in a way which conserves existing institutional structures in education(102). For Codd, the positivistic way of thinking which exhibits these characteristics is a direct product of the dominant motives and interests generated within a technocratic society. These dominant interests are efficiency, effectiveness and productivity of the existing hierarchical social structure(103). Fay(104) points out that while initially the rational approach which serves these interests was needed to "support the continuation of (certain) production processes", the way of thinking (the

positivistic paradigm) which guided that approach has become reified, and has spread as unchallenged orthodoxy to "all facets of life", including education. This point about the pervasiveness of positivism is reinforced by Skolimowski(105):

It is...the empiricist tradition...that looms largest on our intellectual horizons; this is the tradition that, so to speak, has been programmed into our ways of thinking and judging, the tradition that has brought the value-vacuum to our society, to our universities, to our individual lives.

(b) Interpretive Approaches to Educational Research and Evaluation

In the decade of the seventies there has been a continuing process of rethinking in the curriculum field, a process termed by some as "reconceptualisation"(106). Within this period of reconceptualisation, a continuing concern about problems associated with positivistic approaches has led to the emergence of alternative paradigms of educational research and evaluation. Perhaps foremost among these are interpretive approaches.

It was stated earlier (section 2.3a above) that positivistic approaches assume that social contexts of schools and classrooms are systems of distinct empirical variables. Once this assumption is made, it seems reasonable to apply natural science methods of research and evaluation into educational problems and programs. The educational context is treated as a biophysical system. Interpretive approaches, however, reject the assumption

that educational contexts can be treated as biophysical systems.

According to the proponents of interpretive approaches, what is being studied in educational contexts is not a system of inert, invariant, directly-quantifiable objects or interactions, but a flux of human actions each with its own historically-located, personally- and socially-constructed meaning, intents and interests. Interpretive approaches assume that such human actions can only be understood in relation to the meanings in terms of which the human actors make those actions intelligible. In other words, the "phenomena" of educational contexts are human actions; these actions come complete with a set of justifiable meanings; and it is the task of interpretive approaches to educational research and evaluation to explicate those actions and meanings. Carr puts the case for interpretive approaches succinctly:

if educational research is primarily concerned with understanding and explaining actions, rather than with simply observing behaviour, it must cease mimicking the surface features of the natural sciences and devise interpretive explanations which recognise that the actions of individuals stem from the meanings that they themselves construct and of which they are themselves conscious. It further follows that the sort of methods appropriate to the task are not those which aim to produce explanatory hypotheses that can be experimentally tested, but those which seek to construct interpretive accounts which grasp the intelligibility and coherence of social action by revealing the meaning it has for those who perform it(107).

Thus interpretive approaches tend towards qualitative, rather than exclusively quantitative forms of appraisal based on interpretations of experience acknowledged to be

subjective, rather than assumed to be objective. There is also a shift in locus of control in these approaches: their prime concern is with the practical cognitive interests of participants (teachers), rather than with the technical interests of educational policy-makers.

Examples of Interpretive Approaches

(i) Illuminative Evaluation

An important influence in shaping the reconceptualisation of curriculum evaluation in the 'seventies was the 1972 paper by Parlett and Hamilton entitled "Evaluation as Illumination". Parlett and Hamilton's rejection of positivistic approaches is clear in their statement that the primary concern of illuminative evaluation is with description and interpretation rather than measurement and prediction. They set out the aims of the approach as follows:

The aims of illuminative evaluation are to study the innovatory project: how it operates; how it is influenced by the various school situations in which it is applied; what those directly concerned regard as its advantages and disadvantages; and how students' intellectual tasks and academic experiences are most affected. It aims to discover and document what it is like to be participating in the scheme, whether as teacher or pupil; and in addition, to discover and discuss the innovation's most significant features, recurring concomitants, and critical processes. In short, it seeks to address and illuminate a complex array of questions(108).

Several things can be discerned from this passage. First, Parlett and Hamilton clearly discard the analytic/empirical role for a descriptive/interpretive

role. Second, they recognise and seek to explain the effects of contextual factors in the innovation under study. And, third, they perceive evaluation as choosing and explicating issues in an educational setting which help the reader grasp the wholeness of the setting and to develop an empathetic understanding of the lives of participants within the setting.

The authors claim that an understanding of the differences between two concepts, "instructional system" and "learning milieu", is crucial to an understanding of the differences between positivistic approaches and illuminative evaluation. The instructional system is defined by "formalized plans and statements" contained in educational prospectuses - for example, statements of pedagogic assumptions, syllabi, and details of techniques and equipment. These formalised plans provide the statements of goals and objectives which drive the work of the positivistic evaluator: he or she designs tests of performance to determine the degree of congruence between educational outcomes and the goals and objectives of the innovation. For Parlett and Hamilton, a new concept to replace that of the "instructional system" is required if the evaluator is to operate in a non-positivistic fashion. They propose the notion of the learning milieu, which they describe as follows:

The learning milieu represents a network or nexus of cultural, social, institutional and psychological variables. These interact in complicated ways to produce, in each class or course, a unique pattern of circumstances, pressures, customs, opinions and work styles which suffuse the teaching and learning that

occur there(109).

It is the social embeddedness of the innovation which, for Parlett and Hamilton, precludes positivistic approaches: they claim that "innovatory projects, even for research purposes, cannot sensibly be separated from the learning milieu of which they become a part."

The authors propose three stages in illuminative evaluation: observation, in which the investigator builds up a "continuous record of events, transactions and informal remarks"; progressive focussing, in which investigators "systematically reduce the breadth of their inquiry to give more concentrated attention to the emerging issues"; and explanation, which consists in "seeking general principles underlying the organisation of the project; spotting patterns of cause and effect within its operation; and placing individual findings within a broader explanatory context"(110). More specifically, they suggest the use of methods of observation, interviews, questionnaires, and "documentary and background information".

(ii) Evaluation as Case Study

Much has been written about case study as a form of evaluation(111). Perhaps the simplest statement about the case study approach is that it is a family of methods having in common the decision to focus as enquiry around an instance(112). Two points need to be made about case study from the outset(113). First, its research

methodology is eclectic, involving observation (participant and non-participant), interview, audio-visual recording, field notes, document collection and analysis, and negotiation of accounts. Unlike the applied-science methodology of positivistic approaches to evaluation, this methodology does not define the approach. Second, understandings generated about the instance are significant in their own right, not just in terms of what they have to offer, in association with information from other instances, about the class to which all these instances belong. (To argue that accounts of instances are useful only to the extent of what they have to offer about the class is to view case study from a positivist perspective in which the interest in universalising generalisations outweighs the interest in understanding the particular case as a social and historical entity in its own right. In fact, even to use the terms "instances" can be said to invoke the notion of class and thus betray a positivistic interest in instances as instances of classes.)

The notion of case study as an investigation of an instance drawn from a class is an important one. There is the issue of whether the emphasis in the work should be upon the unique features of the instance, or upon its relationship to the class of instances. In case studies conducted with the emphasis upon the instance, a "'bounded system' (the case) is given, within which issues are indicated, discovered or studied so that a tolerably full understanding of the case is possible"(114). The evaluator

endeavours to "tell the story" of the case. Kemmis emphasises empathetic understanding or verstehen in discussing evaluation as portrayal. He describes the role of the evaluator as informing the evaluation audience

about the nature of a program, its unique features, its successes and failures, the issues surrounding it, the people who staff it, and whom it serves. In producing the portrayal, the evaluator acts as mediator, transforming the experience of program participants into a form that can be experienced by the audience(115). Adelman et al proceed to list a number of possible

advantages of case study. They are presented here in full:

(a) Case study data, paradoxically is 'strong in reality' but difficult to organise. In contrast, other research data is often 'weak in reality' but susceptible to ready organisation. This strength in reality is because case studies are down-to-earth and attention holding, in harmony with the reader's own experience, and thus provide a 'natural' basis for generalisation. A reader responding to a case study report is consequently able to employ the ordinary processes of judgement by which people tacitly understand life and social actions around them.

(b) Case studies allow generalisations either about an instance or from an instance to a class. Their peculiar strength lies in their attention to the subtlety and complexity of the case in its own right.

(c) Case studies recognise the complexity and 'embeddedness' of social truths. By carefully attending to social situations, case studies can represent something of the discrepancies or conflicts between the viewpoints held by participants. The best case studies are capable of offering some support to alternative interpretations.

(d) Case studies, considered as products, may form an archive of descriptive material sufficiently rich to admit subsequent reinterpretation. Given the variety and complexity of educational purposes and environments, there is an obvious value in having a data source for researchers and users whose purposes may be different from our own.

(e) Case studies are 'a step to action'. They begin in a world of action and contribute to it.

Their insights may be directly interpreted and put to use for staff or individual self-development, for within-institutional feedback, for formative evaluation, and in educational policy making.

(f) Case studies present research or evaluation data in a more publicly accessible form than other kinds of research report, although this virtue is to some extent bought at the expense of their length. The language and the form of the presentation is hopefully less esoteric and less dependent on specialised interpretation than conventional research reports. The case study is capable of serving multiple audiences. It reduces the dependence of the reader upon unstated implicit assumptions (which necessarily underlie any type of research) and makes the research process itself accessible. Case studies, therefore, may contribute towards the 'democratisation' of decision-making (and knowledge itself). At its best, case study allows the reader to judge the implications of a study for himself(116).

Thus, evaluation as case study is seen by its proponents as shifting the 'locus of control' away from the evaluator. It also raises such issues as the purpose of evaluation, the role of evaluator vis a vis the role of participants in the program being studied, and the generalisability of understandings generated in the study.

(iii) Democratic Evaluation: the politics of information

A number of writers share with Parlett and Hamilton and case study workers a recognition of the complexity of the learning milieu, and of the interactions between the learning milieu and the program in question (the program's social embeddedness). For some(117), however, the process of educational change is perceived as possessing a sharper political edge -- their perspective shows a shift in emphasis from the realm of processes of understanding

social contexts to the question of the politics of information(118).

MacDonald and Walker's conception of educational change recognises that differences exist between the interests of different parties involved in an innovation and appears to reject the notion that the innovation process is or can be technical and rational; instead they regard it as essentially political, characterised by conflict, compromise and negotiation rather than consensus about the search for the best available means within an agreed framework of ends. MacDonald and Walker's main idea is that

the gap between project intent and classroom outcome is not primarily a matter of miscommunication by the project or misuse by the teachers. Rather it is a consequence of a series of 'trade-offs' that are negotiated at each successive point of sale(119).

These trade-offs in meaning are negotiated between developers and teachers and between developers and academic critics, with the developers struggling to maintain legitimacy in the face of the opposing interests of academic critics and classroom practitioners. For MacDonald and Walker, "the net effect of these two bargaining processes is to create a significant gap between the critic's image and the practitioner's image of the innovation"(120). They summarise their perspective on innovation by advancing the following positions:

- (1) Projects are subordinate to the school system, and can only seek their ends within the limitations and constraints of that system.

(2) Projects engage in image manipulation in order to disguise discrepancies between their own educational convictions and the convictions held by others, particularly teachers on the one hand and academic critics on the other.

(3) There is a consequent generation of two distinct and conflicting views held outside a project concerning what the project essentially 'is'; one view held by teachers, the other by critics.

(4) The so-called gap between intent and practice is in part a function of the differences between these two views of the project. The gap is therefore partly 'planned'.

(5) The process of curriculum dissemination, in so far as it assumes a stable message, does not occur. The process to which the term 'dissemination' is conventionally applied would be more accurately described by the term 'curriculum negotiation'(121).

These five propositions about innovation offer a summary of the "politics of information" perspective: they embrace inter-personal conflicts, institutional constraints within the school system, and pressures from professional "worlds" outside the school. This perspective on innovation is compatible with a form of evaluation proposed by McDonald which attempts to take account of the "politics of information" in educational change. His form of evaluation sees the evaluator still an "outsider" to the program, but taking on an independent advocacy role -- "independent" in the sense of being even-handed (though not aspiring to objectivity); an "advocate" in the sense of representing the various political perspectives at play in the program in question. MacDonald says this about "democratic evaluation":

Democratic evaluation is an information service to the community about the characteristics of an educational programme. It recognises value-pluralism and seeks to represent a range of interests in its issue formulation. The basic value is informed citizenry, and the evaluator

acts as broker in exchanges of information between differing groups. His techniques of data gathering and presentation must be accessible to non-specialist audiences. His main activity is the collection of definitions of, and reactions to, the programme. He offers confidentiality to informants and gives them control over his use of the information. The report is non-recommendatory, and the evaluator has no concept of information mis-use. The evaluator engages in periodic negotiation of his relationships with sponsors and programme participants. The criterion of success is the range of audiences served. The report aspires to 'bestseller' status. The key concepts of democratic evaluation are 'confidentiality', 'negotiation' and 'accessibility'. The key justificatory concept is 'the right to know'(122).

Interpretive Approaches - their distinguishing idea and its limitations

These three perspectives on evaluation (illuminative evaluation; case study; democratic evaluation) exemplify a methodological idea that distinguishes interpretive approaches from positivistic approaches. This methodological idea is/interpretation./According to Carr and Kemmis(123), "interpretive social science" is a generic term that includes a variety of positions; they cite Max Weber's(124) definition of sociology as "perhaps the clearest expression of the interpretive standpoint":

Sociology ...is a science which attempts the interpretive understanding of social action...In "action" is included all human behaviour when and in so far as the acting individual attaches a subjective meaning to it . Action in this sense may be either overt or purely inward and subjective; it may consist of positive intervention in a situation, or of deliberately refraining from such intervention or passively acquiescing in the situation. Action is social in so far as, by virtue of the subjective meaning attached to it by the acting individual (or individuals) it takes account of the behaviour of others and is thereby oriented in its course.

Thus interpretive approaches in education, such as the illuminative and democratic approaches and case study, are concerned with the interpretive understanding of educational actions -- with explication of the subjective meanings in terms of which educational practitioners make their actions intelligible.

The notion of "subjective meaning" is crucial here. From the interpretive standpoint, human actions, including educational actions, are intentional and can only be understood in reference to the assumptions, beliefs and purposes (the "subjective meaning") of the actor. In the words of Carr and Kemmis,

Describing an action is always a matter of clarifying the intentions and purposes of the actor. Actions, unlike the behaviour of most objects, always embody the interpretations of the actor, and for this reason can only be understood by grasping the meanings that the actor assigns to them. A task of "interpretive" social science is to discover these meanings and so make action intelligible(125).

However, to understand the actions of an educational practitioner, for example, one needs to do more than grasp the meanings that the practitioner assigns to them -- one also needs to grasp the the social context within which the practitioner's assumptions, beliefs and purposes for action make sense. One also needs to explicate the background rules of the practitioner's professional paradigm. To quote Carr and Kemmis again,

This social character of actions implies that actions arise from the networks of meanings that are given to individuals by their past history and present social order and which structure their interpretation of 'reality' in a certain

way. To this extent, the meanings in terms of which individuals act are predetermined by the languages and 'forms of life' into which they are initiated. But, by the same token, interpretations of 'reality' may be modified and changed by transforming the meanings incorporated in the language employed by individuals to describe and explain themselves and their actions. For this reason, another task of an 'interpretive' social science is to uncover the set of social rules which give point to a certain kind of social activity and so reveal the structure of intelligibility which explains why any actions being observed make sense(126).

Thus interpretive approaches are concerned with understandings in a social/historical framework, rather than with causal explanations couched in a "scientific" framework.

An important methodological idea associated with interpretive approaches is 'verstehen', which is the way a researcher/evaluator communicates with readers by appealing to their social/historical location. Verstehen entails a different appreciation of the "phenomena" of educational settings from that of positivistic approaches: "rather than making the behaviour of peoples the 'facts' of science, attention is given to the interaction and negotiations in social settings through which people reciprocally define expectations about appropriate behaviours"(127). And interpretive approaches are clearly based on a different view of the relationship between knowledge and values: the verstehen of interpretive approaches reconciles knowledge and values in the manner of post-empiricist conceptions of science; by contrast, the empiricism of positivistic approaches separates knowledge and values and ascribes primacy to the

former(128).

The recognition of the importance of the nexus of subjective meaning and action to an understanding of schooling and education in the interpretive approach distinguishes it from positivistic approaches; at the same time, this apparent strength conceals a "weakness" of interpretive approaches.

This weakness has two parts. There is the "epistemological" limitation that interpretivism believes that enhancing individuals' understanding of the meaning of their actions and of their social world (an "enlightenment" function) is sufficient for changing their social reality -- a rationalist theory of action that suggests that ideas precede and guide action rather than being dialectically related to it. Interpretive approaches essentially limit themselves to the construction of an interpretive account of the action/meaning of an educational setting for the purposes of enlightenment of participants in that setting: Parlett and Hamilton seek to contribute to a "broader explanatory context"; MacDonald's democratic evaluator "acts as a broker in exchanges of information between differing groups". Interpretive approaches to educational research and evaluation do not, however, directly entail participants' involvement in the action of "trying out" alternative practices; they do not as a matter of course engage participants in reflection upon the relationship between personal beliefs and actual personal practice (though the conditions are created for

this to occur). In an interpretive evaluation, the outsider agent's interpretive account may improve, through "empathetic understanding", participants' appreciation of the "consensual norms that bind them in patterned ways of acting"(129) -- but it does not require or even encourage participants to try out alternative ways of acting or to test, through their own action (teaching practice), the propositions making up the account. It turns out that interpretive approaches are only "a step to action"; they do not necessarily take anyone into action. Something else remains to be discussed in interpretive social science before understanding becomes compelling for action -- and interpretive social science is silent about what this is. In the words of Popkewitz, "interpretation is to objectify reality through reflection and the reflective act is fundamentally different from acting on the practical matters of changing that reality"(130). Put simply, interpretive understanding is seen as a justifiable end for educational research and evaluation, rather than as a mere moment in a transformative process(131).

Interpretive approaches also have an "ideological" limitation. In a sense, they endow participants with a passive role -- though in a different way to positivistic approaches. While the perspectives of participants are sought, juxtaposed and protected, the active role of constructing an interpretive account from these perspectives belongs to the outside researcher or evaluator.

Since it is the outsider's role to construct the interpretive account, participants are not directly engaged in reflection on the degree of compatibility between individually-held and espoused beliefs about schooling and teaching and their own personal practice. As long as the interpretive account is constructed by an outsider, individual practitioners can "take it or leave it", without necessarily reflecting on the beliefs and assumptions in terms of which they make their own actions intelligible. Owing to their subjectivist and hence relativist epistemology, interpretive approaches are unable to proffer any independent criteria for appraising alternative constructed interpretive accounts. Such accounts seek to "legitimate" actions solely in terms of the beliefs of the actors in the educational setting which the accounts purport to explicate. Interpretive accounts of different settings are not only different, they are incommensurable. According to interpretivist thinking, there is no evident sense in which alternative constructions of beliefs can be regarded as "better" or "worse". They may at best be glimpsed empathetically; at worst regarded as irrelevant. This lack of independent criteria for appraising interpretive accounts confers, by default, a degree of legitimation to the power relations and implicit ideology inherent in the interpreted setting. That is, by these omissions or limitations, interpretive approaches may well, by default, act politically to reinforce the very sets of power relations which make difficult true educational change. In the words of Codd:

From this position (of conceptual and cultural relativism), all claims to knowledge are held to be equally true because there can be no criteria external to those claims by which their truth or falsity can be ascertained. Thus, what is true only for the individual or group who makes a particular claim and the knowledge that each individual has, or each group shares, is completely relative to the practical interests of that individual or group. The truth of knowledge-claims is held to be equivalent to their legitimation by groups sharing common interests. Consequently, there is no way of recognising ideological distortions within the discourse of those groups. It follows from a relativist account, that there can be no criteria outside existing power relationships for justifying any particular political practices. It is not surprising, therefore, that interpretivist social science tends to support the dominant ideology and sustain the hierarchy of social relations(132).

The "political theory" of interpretive approaches to educational research and evaluation, then, is essentially conservative.

(c) Critical Approaches to Educational Research and Evaluation

It is the essentially conservative nature of both positivist and interpretive approaches to educational research and evaluation that critical approaches seek to transcend. Positivist approaches assume the possibility of "objective", neutral knowledge and seek to develop causal explanations of interacting variables and instrumental determinations of program effectiveness. Interpretive approaches strive to develop interpretive accounts explicating the subjective meaning or justification of human actions as perceived by the actors. To the extent that the positivist approach is interested in

practitioners' and participants' viewpoints at all, it construes them as more or less "correct" from the perspective of a "scientific" account of an educational program; it adopts the "objective", "scientific" viewpoint as the basis from which to explain the misunderstandings and self-understandings of program participants. The interpretive approach, by contrast, is closely interested in participants' understandings and self-understandings, but it has great difficulty in accounting for misunderstandings and self-misunderstandings since it offers no standpoint from which these misunderstandings can be perceived. The interpretive approach thus has difficulty in dealing with the issue of ideology (as false consciousness) -- though of course ideology has normally been researched and described through interpretive social science. But the interpretive approach identifies ideology from the perspective of an outsider, building on patterns of understanding and self-understanding identified in social life. If participants' understandings are shaped within a context of oppression, interpretive approaches offer no means for participants to rise above it and see its workings as ideology.

That is, neither the positivist nor the interpretivistⁱ approach is capable of critiquing the ideology of a program: the instrumental bent of positivist approaches focuses attention on relative efficiency of alternative means to given ends (that is, the ends or goals are not critiqued); interpretive approaches, by virtue of their preferred subjectivist epistemology, offer no independent

set of criteria by which the program's interpreted power relations may be critiqued. Critical approaches recognise this lack of ideology-critique as a failing in positivist and interpretive approaches.

One of the distinguishing features of critical approaches to educational research and evaluation is their perspective on the influence of social institutions upon the consciousness and rationality of the individual. The individual is seen as being enmeshed within the patterns of interactions characteristic of complex social and institutional structures -- structures which at once provide opportunities for productive work and disenfranchise absolute individuality of thought and reason. Critical approaches are sensitive to forces of social oppression. For Codd(132) this "distortion of man's ontological vocation is produced by a form of cultural action which absorbs those within it and functions to submerge their consciousness". Popkewitz(133) points to the difficulties individuals face in attempting to "come to grips" with the shaping forces of tradition: "the historical development of tradition and institutions contain reifications and mystifications which make social affairs and social interests opaque". More specifically, in the field of education, this "submerging" effect of social (educational) institutions is perceived as supporting a folklore of unquestioned educational judgements. For Carr(134),

what is distinctive about educational judgements...is that the truth of the beliefs and theories by which they are informed is accepted

in a largely uncritical and unreflective way. It is this unquestioning 'commonsense' attitude that makes conventional educational thinking unscientific by making the problems it creates immune from scientific analysis and resolution.

The aim of critical approaches to educational research and evaluation is to improve the rationality of educational decision-making by revealing for scrutiny the beliefs and theories which much educational thinking takes for granted -- in short, to demystify the patterns of knowledge, professional conduct, and social relations that make up the paradigms of institutional education for those who live and work within them, thereby rendering those paradigms amenable to change.

The notion that knowledge is the outcome in part of actions guided by human interests forms the basis of Habermas'(135) theory of knowledge-constitutive interests. This theory enables a critical social science to be distinguished from both natural science and interpretive science on the criterion of type of cognitive interest served.

To speak of knowledge-constitutive interests is to speak of those natural human interests which have been shaped by historical and social conditions and which in turn shape the sorts of inquiries by which knowledge is generated. They are the interests that are embedded in knowledge, shaping the very character of knowledge itself under the influence of the way in which knowledge is constituted in different settings for particular overarching purposes. For Habermas there are three kinds

of knowledge-constitutive interests.

(i) Technical knowledge-constitutive interests

These are the interests that drive inquiries for knowledge that will improve the possibilities for prediction and technical control over the natural environment. The knowledge generated in these inquiries is most often of the instrumental kind, expressed in terms of causal explanations of phenomena and aimed at the reproduction of human life. Empirical-analytic inquiries typical of the natural sciences are guided by technical knowledge-constitutive interests. Since positivistic approaches to educational research and evaluation are informed by the epistemology and methodology of the natural sciences, they are also characterised by inquiries driven by technical knowledge-constitutive interests.

(ii) Practical knowledge-constitutive interests

The practical knowledge-constitutive interest is concerned with securing and expanding possibilities of mutual and self-understanding through the improvement of ordinary language communication. The knowledge resulting from inquiries guided by the practical interest is in the form of intersubjective, interpretive constructions of the meanings by which practical judgements and actions are justified. The term "practical" is applied because an understanding of one's own life history and tradition, and the ability to interact with other individuals, groups and

cultures (and to understand their respective traditions) is seen as a prerequisite for practice. Symbolic interaction, in which there is debate and negotiation about meanings, goals and values is different to the discourse that takes place in communities of inquiry guided by technical interests; in the latter, the emphasis on instrumental knowledge takes for granted goals and their values, meanings and justifications.

The verstehen of interpretive approaches to educational research and evaluation is guided by practical knowledge-constitutive interests, which in turn are served by the hermeneutic sciences.

(iii) Emancipatory knowledge-constitutive interests

This is the interest which transcends both technical and practical interests and critically appraises the framework of values and power relations governing the character of communication and social action in concrete historical settings and circumstances. This interest is one of emancipation from pseudonatural constraints whose power resides in their nontransparency. As Kemmis(136) puts it, the emancipatory interest is one of "emancipating people from the mystification of ideology, the dictates of habit and precedent, or the compulsions of self-interested authorities". The knowledge resulting from inquiries guided by the emancipatory interest would be in the form of a critique of "the ways and extent to which existing forms of communication may be systematically distorted by

prevailing social, cultural, or political conditions"(137).

Put very simply, then, technical interests are those concerned with increased predictability and control over problems and actions; practical interests seek to improve forms of communication aimed at enlightenment about the problems encountered and actions engaged in during everyday life; and emancipatory interests seek to reduce the opacity of the ways in which powerful social relations distort such communication and maintain problems and actions of certain types.

Habermas' theory of knowledge-constitutive interests can be understood as an example of dominant, opposing, and transcending ideas. The idea of practical knowledge-constitutive interests opposes that of technical knowledge-constitutive interests in the sense that it draws attention to the subjective meanings of actors in a social setting, rather than being concerned entirely (as are technical interests) with instrumental knowledge about causal relations between phenomena. The idea of emancipatory knowledge-constitutive interests transcends these two ideas -- in a sense it embraces the instrumental/causal and the subjective/practical. Knowledge generated by inquiries guided by emancipatory interests seeks to explicate in quasi-causal terms why and how a certain set of power relations obtains in a social setting. Such knowledge goes beyond the mere interpretive description or illumination of the social conditions for

meaningful communication -- it attempts to relate them to influences emanating from a wider social/political framework. However, the relation between "objective" framework and subjective meaning is not causal in the positivistic sense(138). The aim of inquiries guided by the emancipatory interest is to explicate how these relations exert their influence through a process of mystifications, to illustrate the subjectivity of these relations, and thereby to render them amenable to intervention by the very actors whose lives they constrain. The relations between "objective" framework or social/political structure and subjective meanings in terms of which actors make their work intelligible is quasi-causal in the sense that these relations are influential (causal) only by virtue of their uncritically-accepted, mystifying and opaque character.

Critical social science, which is clearly guided by emancipatory knowledge-constitutive interests, aims to emancipate actors by enlightening them about the contradictions supported by mystifying relations hitherto regarded as objective and fixed: it is in this sense that critical social science, like interpretive approaches based on hermeneutic sciences, reconciles facts and values. However, critical social science, unlike interpretive approaches, also reconciles knowledge and action; it illustrates the type of actions which might challenge those "mystifying relations". Whereas interpretive approaches can offer no way of choosing between alternative interpretive constructions of reality

(these are totally relative), for critical approaches a choice between alternative constructions can be made on the basis of their respective usefulness in enabling collective action by oppressed groups as these groups apply their interpretive understandings in a struggle to liberate themselves from the forces of ideology -- whether that ideology be false consciousness or social oppression. Authentic ("validated" -- neither arbitrary nor objectively "true") knowledge is, on a critical social science perspective, is inevitably tied dialectically to collective action (139).

Characteristics of Critical Approaches

When speaking generally about a "critical social science" Fay(140) cites three main features:

- (i) Rejection of the claims of the positivist model about its objectivity and neutrality, and acceptance of the central claim of the interpretivist model that "in order to have a subject matter at all, the social scientist must attempt to understand the intentions and desires of the actors he is observing, as well as the rules and constitutive meanings of their social order".
- (ii) Recognition that many human actions are socially determined. For Fay, a critical social science is distinguished by its efforts at uncovering "those systems of social relationships which determine the actions of individuals and the unanticipated, though not accidental, consequences of these actions".

(iii) Engagement of the dialectical relationship between social theory and social practice. For Fay, the epistemology of critical approaches turns on a recognition that "what is to count as truth is partially determined by the specific ways in which (social) scientific theory is supposed to relate to practical action". Here Fay is saying that different models of social science are based on different perspectives of the relationship between social theory and social practice, with differing implications for what is to count as truth, and that only critical approaches appreciate that this is the case. The particular position adopted by a critical social science is that social theories need to include an account of how such theories are translatable into action. The truth status of theories developed by a critical social science is in part determined by the extent to which they are translatable into action.

To summarise these three characteristics of a critical social science, the following comments can be made. A critical social science does not present itself as capable of offering an objective account of reality; rather it seeks to explicate the ways in which knowledge serves particular human interests. Particular human interests are served as social structures determine the opportunities for and limitations on social actions. A critical social science attempts to uncover social relationships and the

interests they serve, to improve actors' understandings of the way their social lives are determined by conflicts and contradictions in their social order, and importantly, of the ways in which they can act to alleviate imposed constraints by changing that social order. A critical social science, then is enlightening , practical, and emancipatory. It is committed to ideology critique and structural reform through social and political struggle.

Whereas Fay characterises what a social science ought to look like, Carr addresses the more specific issue of the nature of a critical educational science(141). He points to the need for a science that is educational in the sense that it is concerned with understanding the practical human actions of teaching -- actions that can be understood only with reference to the subjective meanings in terms of which practitioners make their actions intelligible. Here Carr confirms Fay's first characteristic of the need for interpretive approaches (guided by the practical interest) rather than positivistic approaches (guided by the technical interest).

Carr also emphasises the need for educational inquiry to be scientific -- by which he means to explain and resolve problems associated with teaching practice in a way that provides a challenge to the interpretations of practitioners referred to above. It is important to note that Carr's sense of "scientific" is post-empiricist, rather than the conventional empiricist one:

The idea that theory can be scientifically tested independently of practice and then used to correct or assess any educational practice would have to be replaced by the diametrically opposite view that an educational theory only acquires a scientific character if it can itself be corrected and assessed in the light of its practical consequences(142).

In stressing the need to challenge previously taken-for-granted justifications and meanings, Carr's prescriptions go beyond descriptive interpretation guided by the practical interest, and encourage a form of inquiry guided by the emancipatory interest. For Carr, the aim of a critical educational science is to develop "methodological principles and procedures that will emancipate practitioners from their dependence on habit and tradition..."(143).

As a summary of the foregoing, Carr and Kemmis' "five formal requirements for any adequate and coherent educational science" are presented here. They provide a set of principles for a form of educational research and evaluation that may lay claim to be guided by the emancipatory interest.

- (i) It must reject positivist notions of rationality, objectivity and truth.
- (ii) It must employ the interpretive categories of teachers (or other participants directly concerned with the practices under inquiry).
- (iii) It must provide ways of distinguishing ideas and interpretations which are systematically distorted by ideology from those which are not, and provide a view of how distorted self-understandings can be overcome.
- (iv) It must be concerned to identify and expose those aspects of the existing social order which frustrate rational change, and must be able to

offer theoretical accounts which enable teachers (and other participants) to become aware of how they may be overcome; and

(v) It must be based on an explicit recognition that it is practical in the sense that the question of its truth will be determined by the way it relates to practice(144).

(d) Summary

In this section 2.3, three different approaches to educational research and evaluation have been considered. Each of these approaches adopts a different epistemology and serves different interests. Table 4 summarises some of these key differences. Once again, this provides a criterion -- that of epistemological congruence -- to be invoked in determining the coherence of certain contesting approaches to educational research and evaluation with environmental education, and enables another "dimension" to be added to the framework for critique of environmental education.

TABLE 4 : THREE APPROACHES TO EDUCATIONAL RESEARCH & EVALUATION

APPROACH	EPISTEMOLOGY	VIEW OF EDUCATIONAL CONTEXTS	OBJECTS OF INQUIRY	RATIONALITY	INTERESTS SERVED	METHODOLOGY
POSITIVIST	ACCEPTS NATURAL SCIENCE EPISTEMOLOGY (EMPIRICIST). KNOWLEDGE IS SEEN AS OBJECTIVE AND VALUE-FREE.	THE SOCIAL CONTEXTS OF SCHOOLS ARE SYSTEMS OF DISTINCT EMPIRICAL VARIABLES.	PRACTITIONERS ARE SEEN AS TECHNICIANS PASSIVELY CONFORMING TO THE RECOMMENDATIONS OF RESEARCHERS AND THEORISTS.	IMPARTED BY DESIGN, TECHNIQUES, AND INSTRUMENTS. TO BE RATIONAL IS TO BE EMPIRICIST. (MISSES EDUCATIONAL ASPECT OF EDUCATIONAL PROBLEMS BECAUSE IT FAILS TO ENGAGE THE INTERPRETIVE CATEGORIES OF TEACHERS.)	TECHNICAL: PRIME CONCERN IS TO DETERMINE THE EFFECTIVENESS OF AN EDUCATIONAL PROGRAM AND TO BE ABLE TO PREDICT & CONTROL PROGRAM EVENTS. ACTIVELY SERVES BUREAUCRATIC INTERESTS.	APPLIED SCIENCE: QUANTITATIVE MEASUREMENT OF THE CONGRUENCE OF GOALS & OUTCOMES BY AN OUTSIDE RESEARCHER/EVALUATOR.
INTERPRETIVIST	HERMENEUTIC : REJECTS NATURAL SCIENCE EPISTEMOLOGY, SUBJECTIVIST: NO INDEPENDENT CRITERIA FOR CHOOSING BETWEEN ALTERNATIVE INTERPRETIVE CONSTRUCTIONS OF SOCIAL REALITY.	A FLUX OF HUMAN ACTIONS EACH WITH ITS OWN PERSONALLY & SOCIALLY CONSTRUCTED MEANING, INTENTIONS, AND INTERESTS.	THE INTERPRETIVE CATEGORIES OF PRACTITIONERS.	RATIONALITY IS THE EXPLICATION OF BELIEFS ACCORDING TO WHICH DECISIONS ABOUT EDUCATIONAL ACTIONS ARE JUSTIFIED. MISSES EDUCATIONAL PROBLEMS BECAUSE FAILS TO ADDRESS INCOHERENCE BETWEEN BELIEF & ACTION.	PRACTICAL: SEEKS TO IMPROVE COMMUNICATION BETWEEN PRACTITIONERS ABOUT EDUCATIONAL BELIEFS & JUSTIFICATIONS BY DEFAULT, REINFORCES EXISTING POWER RELATIONS, THEREBY SERVING BUREAUCRATIC INTERESTS.	VERSTEHEN: AN OUTSIDE AGENT CONSTRUCTS INTERPRETATIONS OF THE SUBJECTIVE MEANINGS IN TERMS OF WHICH PRACTITIONERS CONSTRUCT THEIR PRACTICE.
CRITICAL	POST-EMPIRICIST : REJECTS NATURAL SCIENCE EPISTEMOLOGY, EXPLICATES THE WAYS IN WHICH KNOWLEDGE SERVES HUMAN INTERESTS. CHOOSES BETWEEN ALTERNATIVE CONSTRUCTIONS ON CRITERION OF USEFULNESS IN ENABLING LIBERATING COLLECTIVE ACTION BY OPPRESSED GROUPS.	A COMPLEX INSTITUTIONAL STRUCTURE WHOSE POWER RELATIONS ACT POLITICALLY IN PROVIDING OPPORTUNITIES FOR PRODUCTIVE WORK, & DISENFRANCHISING INDIVIDUALITY OF THOUGHT & REASON.	EDUCATIONAL PRACTICES, WHICH ARE VIEWED IN RELATION TO PRACTITIONERS' THEORIES WHICH GUIDE THEM, & THE SITUATIONAL STRUCTURES & RELATIONS WHICH SHAPE THEM.	RATIONALITY IS LOGICAL & POLITICAL COHERENCE BETWEEN BELIEF & ACTION.	EMANCIPATORY: BY THE PROCESSES OF CRITICAL REFLECTION UPON PRACTICE & IDEOLOGY CRITIQUE, AIMS AT FREEING PRACTITIONERS FROM "MYSTIFICATIONS OF IDEOLOGY, THE DICTATES OF HABIT & PRECEDENT, & THE COMPULSIONS OF SELF-INTERESTED AUTHORITIES".	CRITICAL PRAXIS: PRACTITIONERS THEMSELVES ENGAGE IN RECURRENT CYCLES OF PLANNING, ACTION, & REFLECTION TO IMPROVE THEIR OWN ACTION, THEIR UNDERSTANDINGS OF THEIR ACTION, AND THE SITUATIONS/ INSTITUTIONS IN WHICH THEIR ACTION & UNDERSTANDINGS ARE LOCATED.

2.4 The Nature of Education

One prominent perspective(145) on environmental education is that it "should help the public question its misconceptions concerning the various problems of the environment and the value systems of which these are a part". This perspective on environmental education implies a particular educational interest. Environmental education is, according to this perspective, interested in social critique; it is not (apparently) interested in "training for jobs", nor in simply contributing to the "educated person". In order to be able to argue these propositions, it is necessary first to outline certain perspectives on the role and purpose of education itself, and to distinguish between these perspectives in terms of their underlying epistemology. No attempt will be made to be comprehensive: the intention is simply to sketch three views of the role of education(146).

(a) Vocational Education

The first, and probably dominant view, is that education should be organised with an eye to the current job market. This vocational view of education seeks to prepare students for gainful employment within the current socio-economic structure. This view of education is "vocational" in more than the obvious sense that it prepares students for particular, existing vocations; it also inculcates in students a view of what are available, attainable or desirable vocations.

Of course, the notion of "available, attainable or desirable vocations" makes sense only if the present socio-economic structure is taken for granted. Thus the vocational view of education is essentially conservative, being aimed at reproducing society with its existing opportunities for and limits upon employment, and replete with its current social inequalities. This view of education recognises the importance of socio-economic status in our existing social structure, and in fact reinforces the relationship between "class" and vocation by preparing students for work in high status jobs (owners of capital, professionals), middle status jobs (technical and managerial personnel) and low status jobs (blue-collar workers). To the extent that vocational education succeeds in this aim, it engages in the sorting of students on the criterion of perceived class heritage.

The vocational view of education is conservative in two senses: not only does it engage in social reproduction, it also seeks to achieve its aims by teaching what has become traditionally to be regarded as "worthwhile knowledge". Vocational education is characterised by an emphasis on disciplinary skills and knowledge, and is informed by an objectivist epistemology.

(b) Liberal Education

According to the liberal view, education is seen as a personal value, rather than as an instrumental means to a

vocational end. On this view,

education must develop a sense of the good, true and beautiful in every child, and can do this by recognising these virtues in children and building on them through creative and engaging tasks. It takes an individualist perspective on social philosophy, and sees the development of autonomous persons as the aim of education(147).

The liberal view of education recognises that inequalities exist in the current socio-economic structure, and sees these inequalities as able to be redressed through an ability to recognise virtue, and through individual self-expression. The liberal view of education, with its emphasis on individualism, is informed by a subjectivist epistemology.

(c) Socially-Critical Education

The socially-critical view of education differs to the liberal view in its scepticism of the ability of individual action, however well intentioned, to bring about significant social change -- to properly engage the social inequalities which are recognised in both views of education. On this view, social change can be brought about only by collective action. Hence, both teachers and pupils should participate in negotiation about the subject matter in schools and how it is taught, the school should participate in the workings of the community and the community should participate in shaping the curriculum of the school, and education should be committed to "real, experience-based, collaborative learning about socially-useful matters". In relation to the last point,

socially-critical education reconciles knowledge and action -- it sees understandings about social relationships as emanating from attempts to engage those relationships in a practical manner. Its epistemology is "dialectical".

In the words of Kemmis, Cole and Suggett(148), socially-critical education aims at bringing about the improvement of society by "collective action capable of confronting unjust and irrational social structures". They go on to describe some of the characteristics of socially-critical education:

According to the proponents of the socially-critical orientation, education must engage society and social structures immediately, not merely prepare students for later participation. It must engage social issues and give students experience in working on them -- experience in critical reflection, social negotiation and the organisation of action. Education must develop the power of constructively critical thinking, not just in individuals but also in group processes. The substance of education, according to this orientation, must emphasise social and critically-reflective processes, not only what history has thrown up as worth knowing. Even what history bequeaths us is a product of irrational and unjust processes, and it must be understood and criticised as such.

Embedded in this quotation are strong notions of collaborative work, a dialectic between knowledge and action, a critique of the assumptions, beliefs and power relations at play in society, and a scepticism of time-honoured forms of knowledge (the "disciplines").

Kemmis, Cole and Suggett proceed to set out a matrix of the three forms of education in terms of the stances they

take on a number of topics. Key among these topics for the purposes of the "framework for critique" being developed in this Chapter are (i) their views of desired student outcomes, (ii) their views of knowledge, (iii) their view of the student role, and (iv) their view of broad curriculum organisation. These perspectives are extracted and presented here (Table 5) as a summary of this section. They provide another dimension to be considered in deliberation aimed at improvement of the self-understandings of environmental education.

2.5 Conclusion: Contestation and Coherence

Put simply, the image developed in this chapter comprises four education-related dimensions in each of which there is a number of viewpoints contesting with each other for acceptance:

Dimension 1 (nature of science): empiricist (inductive or deductive), hermeneutic/subjectivist, post-empiricist.

Dimension 2 (nature of innovation):(eg) technicist, liberal/political, ideological.

Dimension 3 (nature of educational research and evaluation): positivist, interpretive, critical.

Dimension 4 (education): vocational, liberal, socially critical.

While on every dimension there are paradigmatic differences (on dimension 1, for example, empiricist

TABLE 5: THREE VIEWS OF EDUCATION (AFTER KEMMIS, COLE AND SUGGETT, 148)

VIEW OF EDUCATION	KNOWLEDGE	DESIRED STUDENT OUTCOME	STUDENT ROLE	BROAD CURRICULUM ORGANIZATION
<u>VOCATIONAL</u>	OBJECTIVE: A PUBLIC MATTER, EXISTS IN BOOKS, PERFORMANCES, MOSTLY DESCRIBED AS SKILLS AND INFORMATION (FACTS, CONCEPTS), WHICH HAVE THEIR MEANING AND SIGNIFICANCE IN OCCUPATIONAL OR DISCIPLINARY CONTEXTS...	FINDING ONE'S PLACE IN SOCIETY, HAVING THE SKILLS TO FULFILL WORK ROLES	A RECEIVER OF TRANSMITTED KNOWLEDGE, MORE OR LESS PREPARED TO ACHIEVE WITHIN THE FRAMEWORK OF WHAT IS TAUGHT.	RIGID SUBJECT DIFFERENTIATION AND TIMETABLING; STRINGENT SELECTION OF STUDENTS BASED ON PERFORMANCE CRITERIA.
<u>LIBERAL</u>	SUBJECTIVE: A 'PRIVATE' OR INDIVIDUAL MATTER, EXISTS 'IN THE HEAD' OF THE INDIVIDUAL...	THE 'EDUCATED PERSON', ONE WHO IS SELF-ACTUALISING, REFLECTIVE AND POTENT AS A HUMAN BEING WHO HAS LEARNED HOW TO LEARN AND TO PURSUE HIS/HER OWN VISION OF THE TRUE AND THE GOOD.	AN ACTIVE CONSTRUCTOR OF KNOWLEDGE THROUGH EXPERIENCE AND OPPORTUNITIES TO DISCOVER AND INQUIRE, MORE OR LESS ABLE TO TAKE ADVANTAGE OF OPPORTUNITIES IN TERMS OF PREPARATION AND OWN PREVIOUS EXPERIENCES.	WEAK SUBJECT DIFFERENTIATION AND TIMETABLING; SELECTION OF STUDENTS ON BASIS OF INTEREST AND READINESS.
<u>SOCIALLY-CRITICAL</u>	DIALECTICAL: AN INTERPLAY OF SUBJECTIVE VIEWS OF THE WORLD AND CULTURAL FRAMEWORKS IN WHICH THEY ARE LOCATED...	A CRITICAL AND CONSTRUCTIVE CO-PARTICIPANT IN THE LIFE AND WORK OF SOCIETY, WHO SEES SELF-ACTUALISATION IN A SOCIAL CONTEXT, WHO PURSUES THE TRUE AND THE GOOD IN TRANSFORMING AND BEING TRANSFORMED BY SOCIETY, NOT PURELY INDIVIDUALISTICALLY.	A CO-LEARNER, USING AVAILABLE KNOWLEDGE THROUGH INTERACTION WITH OTHERS IN SOCIALLY-SIGNIFICANT TASKS OF CRITIQUE OR COLLABORATIVE WORK.	DIFFERENTIATION OF SUBJECTS AND USE OF TIME BASED ON NEGOTIATION BETWEEN COMMUNITY, TEACHERS AND STUDENTS ABOUT THE 'WHOLE CURRICULUM AS A 'PROJECT'; 'SELECTION' IS BASED ON COMMITMENT TO TASKS, THE LIMITS OF RESOURCES, EXPERTISE AND CAPACITY TO PARTICIPATE PRODUCTIVELY IN COMMON ACTIVITIES.

conceptions of science are incommensurable with post-empiricist conceptions), there does exist some paradigmatic compatability across dimensions. For example, empiricist conceptions of science, technicist perspectives on innovation, positivist approaches to educational research and evaluation, and vocational orientations to education are all informed by the same epistemology -- they all subscribe to the notion of independently existing, generalisable knowledge. Similarly, post-empiricist conceptions of science, ideological perspectives to innovation, critical approaches to educational research and evaluation, and socially-critical orientations to education are all informed by another epistemology -- one that sees knowledge as historically located and socially constructed. Perspectives which are paradigmatically compatible thus offer the prospect of being logically coherent: the coupling of different educational activities aligned with paradigmatically compatible perspectives is logically defensible.

Contestation in scientific knowledge, educational innovation, educational research and evaluation, and education itself does not occur simply "in theory" as philosophical speculation. There are, as we will see, many examples in environmental education of contestation in each of these dimensions. And, given the notion of coherence, choices about these contesting perspectives are not independent of each other. To foreshadow one example, it will be argued that to adopt an RDDA-type innovation strategy in an attempt to promote a socially-critical form

of environmental education is incoherent: the former is based on an empiricist view of scientific knowledge; the latter is based on a post-empiricist view of knowledge.

A Framework for Critique

With this principle of logical coherence in mind, it is possible to collapse the perspectives considered in sections 2.1, 2.2, 2.3 and 2.4, and summarised in Tables 1, 3, 4 and 5 into a single framework for critique. This framework is organised into three logically coherent, ideal-typical educational positions:

Position 1:

- 1.1 empiricist view of knowledge
- 1.2 technicist view of innovation
- 1.3 positivist view of research
- 1.4 vocational view of education

Position 2

- 2.1 subjectivist view of knowledge
- 2.2 liberal/political view of innovation
- 2.3 interpretivist view of research
- 2.4 liberal view of education

Position 3

- 3.1 post-empiricist view of knowledge
- 3.2 ideological view of innovation
- 3.3 critical view of research
- 3.4 socially-critical view of education

It is argued that each of these positions is internally logically coherent, that the components of each position are mutually self-supporting or hegemonic, and that each of these positions contains different assumptions about social life in general and educational theory and practice in particular. It is also argued, however, that the first two of these positions have internal weaknesses -- they each are subject to particular criticisms that they have difficulty answering, while the third position transcends these criticisms. To put this point another way, an educational setting informed by a post-empiricist view of scientific knowledge, and characterised by an ideological view of educational change, a critical view of educational research, and a commitment to a socially-critical orientation to education, would represent a coherent "edifice" in education. This thesis suggests that there are three possible coherent "edifices" in education (in each of which there are four components matched to each other in design), but also that one is more secure than the other two -- the four internal structural components of the other two are more or less weakened by the corrosive acid of unanswered criticism. Thus, in this thesis, Position 3 represents the best justified perspectives on knowledge, innovation, research, and education.

The three educational positions are labelled with the descriptors "technicist", "liberal" and "critical" (see Table 6) and represent the frame of reference for the

TABLE 6 : A FRAMEWORK FOR CRITIQUE

"IDEAL-TYPICAL" EDUCATIONAL POSITION	VIEW OF SCIENTIFIC KNOWLEDGE	PERSPECTIVE ON INNOVATION	APPROACH TO EDUCATIONAL RESEARCH AND EVALUATION	ORIENTATION TO EDUCATION
POSITION 1 : "TECHNICIST" (logically coherent) →	EMPIRICIST	TECHNICIST	POSITIVIST	VOCATIONAL
POSITION 2 : "LIBERAL" (logically coherent) →	HERMENEUTIC	LIBERAL/POLITICAL	INTERPRETIVIST	LIBERAL
POSITION 3 : "CRITICAL" (logically coherent) →	POST-EMPIRICIST	IDEOLOGICAL	CRITICAL	SOCIALLY-CRITICAL

critique of environmental education to be mounted in this thesis.

As used here, the term "critique" shall entail two functions. It will firstly entail a mapping function, in which aspects of the environmental education movement are located against the frame of reference. For example, an aspect of the language (or organisation, or practice) of the movement at the international (or national, or local) level may be representative of a vocational (or liberal, or socially-critical) orientation to education. This "mapping" function of the critique of the movement will serve to identify contestation between perspectives in environmental education; this "mapping" forms the basis for Part III of the thesis.

The second function of "critique" entailed in this thesis is the making of judgements about the coherence of the contesting perspectives in environmental education. This evaluative function of critique will take place in Parts III and IV. Particular attention will be paid in Part IV to the resonances between educational research on the one hand and environmental education on the other. The "framework of critique" enables us to ask two questions about the environmental education movement:

To what extent is environmental education organised in a coherent fashion -- that is, are its policies, organisational strategies and educational practices consistent and compatible?

What is the nature of the relationship of these three ideal-typical educational positions (technicist, liberal and critical) with the aspirations of the environmental education movement?

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a great deal remains to be done with respect to identifying variables or groups of variables which will predict behaviour. Be that as it may, research is beginning to tease out variables which should be seriously considered as important to the overall process of changing behaviour. Through this research, we have learned enough about environmental behaviour to be able to predict at least some of the elements which must be incorporated into institutional programs in order to make them successful.

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103. Codd, J. (op. cit - see note 86).
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106. See for example:

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- (b) Pinar, F. "The Reconceptualization of Curriculum Studies". Journal of Curriculum Studies 10(3): 205-214, 1978.
- (c) House, E. "Technology versus Craft: A Ten Year Perspective on Innovation". Journal of Curriculum Studies 11(1): 1-15, 1979.

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109. Parlett, M. and Hamilton, D. (op. cit - see note 108).

110. Parlett, M. and Hamilton, D. (op. cit - see note 108).

111. See for example, the following:

- (a) Stake, R. "The Case Study Method in Social Inquiry". Educational Researcher 7: 5-8, 1978.
- (b) Shaw, K. "Understanding the Curriculum: the Approach through Case Studies". Curriculum Studies 10(1): 1-17, 1978.
- (c) Stenhouse, L. "Case Study and Case Records: towards a contemporary history of education". British Educational Research Journal 4(2): 21-39, 1978.
- (d) Hamilton, D. "A Science of the Singular?". Mimeograph. CIRCE, University of Illinois, 1976.
- (e) Stenhouse, L. "Case Study in Comparative Education: particularity and generalisation". Comparative Education 15(1): 5-10, 1979.
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(b) Chesler, M., Crowfoot, J. and Bryant, B. Jr. "Using Institutional Conflict to Achieve Change in Schools". Chapter 3 in Milstein, M. (ed.). Schools, Conflict and Change. New York: Teachers College Press, 1980.
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126. Carr, W. and Kemmis, S. (op. cit. - see note 14).
127. Popkewitz, T. Paradigm and Ideology in Educational Research: The social functions of the intellectual. London: The Falmer Press, 1984.
128. For a consideration of the respective epistemologies of positivism (empiricist methods) and interpretivism (the method of verstehen), see:
(a) Fay, B. Social Theory and Political Practice. London: Allen and Unwin, 1975.
(b) Freeman, H. and Jones, A. "Educational Research and Two Traditions of Epistemology". Educational Philosophy and Theory. 12: 1-20, 1980.
(c) Erikson, E. "Verstehen and the Method of Disciplined Subjectivity". In Lerner, D. (ed.). Evidence and Influence. :Free Press, 1959.
(d) Outhwaite, W. Understanding Social Life: The Method Called Verstehen London: Allen and Unwin, 1975.
129. Popkewitz, T. (op. cit - see note 127).

130. Popkewitz, T. (op. cit - see note 127).
131. Codd, J. "Educational research as political practice". Paper presented to the Australian Association for Research in Education National Conference. Canberra: November, 1983.
132. Codd, J. (op. cit - see note 131).
133. Popkewitz, T. (op. cit - see note 127).
134. Carr, W. (op. cit - see note 37).
135. Habermas, J. Theory and Practice. Tr. John Veiertel. London: Heinemann, 1974.
136. Kemmis, S. (op. cit - see note 118).
137. Carr, W. and Kemmis, S. (op. cit - see note 14).
138. Fay, B. (op. cit - see note 104).
139. The view that interpretive constructions of social reality can be validated through their effectiveness in enabling liberating, collective action by oppressed groups is ascribed by Freeman and Jones to the work of M. F. D. Young -- see Freeman, H. and Jones, A. "Educational research and two traditions of epistemology." Educational Philosophy and Theory 12 (2): 1-20, 1980. The authors comment on the status of the criterion of validation through practice: they acknowledge that the criterion cannot be regarded as absolute, since to do so would be to accept the possibility of an objective knowledge; they claim that the principle "is itself possible of rejection if an alternative criterion is later shown to be more supportable". Freeman and Jones go on to say that

this position accommodates the elements of relativism necessary to any sociology of knowledge without slipping back into a total relativism, denying the absolutist claim that it is possible at any time to assert that one theory or criterion is categorically best. The choice is always relative to interests which are socially and historically situated and which currently reflect existing relations of power and dominance.
140. Fay, B. (op. cit - see note 104).
141. Carr, W. (op. cit - see note 37).
142. Carr, W. (op. cit - see note 37).
143. Carr, W. (op. cit - see note 37).
144. Carr, W. and Kemmis, S. (op. cit - see note 14).
145. UNESCO Environmental education in the light of the

Tbilisi conference. Paris:UNESCO, 1980.

146. This sketch of three views of education draws upon a report prepared within the Victorian Institute for Secondary Education on behalf of an internal working committee exploring the relationships between curriculum and transition: Kemmis, S., Cole, P. and Suggett, D. Orientations to curriculum and transition: Towards the Socially-Critical School. Melbourne: Victorian Institute of Secondary Education, 1983.

147. Kemmis, S., Cole, P. and Suggett, D. (op. cit - see note 145).

148. Kemmis, S., Cole, P. and Suggett, D. (op. cit - see note 145).

149. Kemmis, S., Cole, P. and Suggett, D. (op. cit - see note 145).

PART II: DEVELOPMENTS IN ENVIRONMENTAL EDUCATION

PREAMBLE

This Part of the thesis will attempt to place the reader into an environmental education context. Chapter 3 and the first part of Chapter 4 will present a brief, selective history of the UNESCO / UNEP Programme on environmental education, providing a perspective on how this program was a response to a "grass-roots" concern about the environment, and how this response was shaped by a number of ideas originating in the community, in schools, and in the academic world at international and national levels. Chapter 4 will also illustrate how, at the Australian national level, the Curriculum Development Centre (C.D.C) maintained the momentum of the environmental education movement through large-scale curriculum project development. Brief encapsulating versions of reports of evaluation studies conducted by the author on two C.D.C. projects will be presented. Chapter 5 will present accounts of two local (school-level) instances of environmental education -- these accounts are also versions of reports of studies conducted by the author.

In the period 1979-1984, the author was involved as a researcher/evaluator in four efforts in environmental education. In two of these he acted as evaluator of a national curriculum development project in environmental education. The first involvement was with the Investigating the National Estate (INE) materials(1) which were released in 1980; the second was with the

Environmental Education Project (EEP) materials(2)

released in 1981. Both sets of materials were developed and disseminated by Australia's national Curriculum Development Centre; both evaluations were sponsored by the Centre. In the period since the beginning of the work sponsored by C.D.C., the author engaged also in a study of two local environmental education efforts -- one with a group of primary school teachers(3), and one with a group of secondary school teachers, both in Geelong. All of these involvements required a close working relationship with practising teachers grappling with curriculum and classroom practice issues to do with environmental education. However, there are differences in method between the studies reported here -- differences which, in a sense, reflect the environmental education slogan "Think Globally, Act Locally". In particular, the author has been a participant in, and had an influence on, the "local" projects, which are highly selected in terms of the author's interests in "education for the environment" and action research.

The two C.D.C.-related investigations do not represent traditional educational evaluation: they are not based on the application of a set of explicit criteria to some outcome (student achievement for example), but rather they are an attempt to gather information and arguments from a range of perspectives to inform debate and action in respect of environmental education innovation. A range of methodologies -- including questionnaire surveys, telephone interviews, case study, policy analysis and

action research -- was employed in these investigations, allowing reflection upon the relationship of such methodologies with the spirit and intentions of environmental education. The accounts presented here are considerably shortened versions of the formal reports submitted to the Curriculum Development Centre.

Part II of the thesis, then, includes brief accounts of four efforts in environmental education innovation. The four accounts will be treated as "archives" for the present study: they provide a data-base from which the four main theses of the study (introduced in Chapter 1) can be explored. Whenever appropriate, instances from these archival accounts will be retrieved to support the set of propositions elaborating the four main theses; the argument establishing these propositions is developed in Part III and Part IV.

NOTES

1. C.D.C. Investigating The National Estate Canberrrs: Curriculum Development Centre, 1980.
2. See C.D.C. Environmental Education: A Sourcebook for Primary Education Canberra: Curriculum Development Centre, 1981.
3. See Robottom, I. "School-based Environmental education: an action research report". Environmental Education and Information, (in press, 1985).

CHAPTER 3: INTERNATIONAL DEVELOPMENTS

By the laws of nature man cannot live without food. Whatever may be the rate at which population would increase if unchecked, it can never actually increase in any country beyond the food necessary to support it(1).

As a pioneer in the treatment of demographic problems, Thomas Malthus (1766-1834) raised early environmental concerns. His thesis that population, when unchecked, increases in geometrical ratio while subsistence increases in arithmetical ratio provided the stimulus to concerns about the relationship of population growth rates and "quality of life". While many other early examples of increasing awareness of the existence of environmental problems may be found(2), they are not the concern of this thesis; here, we will be concerned with those events of the 1960s and onwards which created the sharpest images of environmental crisis.

Rachel Carson's disturbing book Silent Spring (3) prompted widespread debate and activities in the community about the preservation of the environment in the light of perceived pollution problems -- especially those concerning pesticides. Her message was that the mass production of pesticide pollutants such as DDT and lead compounds and their widespread utilisation around the world is endangering the entire biosphere. On 24 December 1968, the spacecraft Apollo 8 beamed to the world community clear photographs depicting the Earth in its context of limitless black space. For the very first time,

men and women of the world were provided with dramatic symbolic support to the notion of the finiteness of Earth's resources:

For the first time men and women realized the limitations of the earth's resources, the delicate balance of forces which have made Earth inhabitable, and the inevitable consequences of man's continuing prodigality. For the first time, they understood what the environmentalists, conservationists, and ecologists had been trying to convey(4).

Some of these "environmentalists, conservationists, and ecologists" who were active before and after Apollo 8 in raising community consciousness about the relationship between population, resources and environment were Holdren and Ehrlich(5), Barry Commoner(6), and the "club of Rome"(7). Holdren and Ehrlich present an eloquent perspective on the world of their day:

The world faces today a multiplicity of crises: explosive political and ideological conflicts, rampant malnutrition, grinding poverty, and inexorable erosion of the natural environment to support life. These extant and potential disasters are inextricably entwined with each other and with a global population size and growth rate unprecedented in the tenure of Homo sapiens on Earth. Together they preclude a humane and fruitful existence for a considerable fraction of the world's inhabitants, they bid fair to destroy such worthwhile values as today's civilisation may embody, and in their most sinister aspects they imperil even the habitability of the planet.

The club of Rome, an international group of industrialists and others, used computer projections to confirm the Malthusian proposition that growth is exponential, and to reach the view that the limits of the planet in supporting this growth are being approached. The public's increasing realisation that environmental issues

were important can be gauged from the efforts in a number of countries to protect and enhance Earth's resources. International community action groups like "Zero Population Growth" (ZPG) and "Friends of the Earth" (FOE) came into existence. In 1968, the British Society for Social Responsibility in Science was established, with a main aim "to stimulate among scientists an awareness of the social significance of science, and of the scientist's corresponding responsibility towards society"(8). At an international conference of this society in 1970, serious environmental problems were not only acknowledged, but the relationship between those problems, society, and the structure of scientific research traditions was discussed at length(9).

The period of the late 'sixties and early 'seventies, then, was characterised by an increasing "grass-roots" community concern about environmental problems and about the ability of science to handle those problems(10). For Malcolm, this period was an

era of the antiscience movement, the environmentalist movement, the antiwar movement and movements to liberate blacks, women and homosexuals. It was a movement against exploitation for economic 'progress', against mass distribution and mass control, including mass schooling. It was a cultural exhortation for recognition of individuality and individual worth(11).

It was as a response to this increasing environmental consciousness at the international, "grass-roots", community level that the United Nations became concerned with questions about population, resources and environment, and organised in 1972 a United Nations

Conference on the Human Environment at Stockholm.

The conference at Stockholm was a landmark in that it signalled a degree of international unity in the recognition of, and concern about, problems to do with population, resources and environment. At the conference itself, there was sufficient evidence to establish that environmental problems transcend national frontiers(12): it was recognised that the environmental crisis was global. The conference heard statements that concerned issues which were not only environmental, and not only international in nature, but also sharply political. Some of these statements were:

The need to conserve rapidly dwindling resources must be associated with concern for the majority of the world's population which has not yet had its share.

A minority of countries and of the world's population account for the majority of its energy consumption and produce most of its pollution. However, these are concomitants of a standard of living not yet enjoyed by the majority, who might rightly aspire to much of it.

There are very real threats to the continual existence of unique aspects of the natural order and humanity's historic heritage.

The immediate environment of millions would be regarded by many others as quite intolerable.

It is worth reiterating here that the United Nations involvement in environmental education was a response to, rather than an initiator of, the worldwide, grass-roots, community-based attitude of concern about the environment(13). And, while environment-related activities were current in schools at that time in the form of nature studies and outdoor education programs, these tended to be an outcome of liberal-progressive educational philosophies

of Dewey and others(14) and were politically if not historically independent of the types of issues discussed at the Stockholm conference(15).

The conference was also the beginning of a concerted, long-term involvement by the United Nations in the development of an international program in environmental education. Among the recommendations made at the Stockholm conference was the following:

The Secretary-General, the organisation of the United Nations system, especially UNESCO, and the other international agencies concerned, should, after consultation and agreement, take the necessary steps to establish an international program in environmental education, interdisciplinary in approach, in school and out-of-school, encompassing all levels of education and directed towards the general public, in particular the ordinary citizen living in rural and urban areas, youth and adult alike, with a view to educating him as to the simple steps he might take, within his means, to manage and control his environment(16).

In response to this recommendation, an internationally constituted UNESCO working group outlined a three-year international environmental education program in 1974. In January 1975 this was supported by the United Nations Environment Programme (UNEP). This combined UNESCO/UNEP Programme foresaw a series of activities, including

- * preparation of an international workshop;
- * a workshop in Belgrade (October 1975) with the formulation of recommendations for environmental education;
- * introduction and control of environmental education, by the implementation of the Belgrade recommendations;
- * regional seminars of experts on environmental

education in order to continue the work begun in Belgrade;

* a world conference on environmental education at governmental level(17).

The UNESCO/UNEP Environmental Education Programme, whose secretariat was headed by Professor William Stapp of the University of Michigan, duly convened the Belgrade International Workshop on Environmental Education in Belgrade in October, 1975. Participating in the Belgrade Workshop were approximately 100 educational specialists from 64 countries(18). The Workshop aimed to review and discuss the trends and emerging issues in environmental education and to formulate guidelines and recommendations for furthering the movement internationally. Discussions at the Workshop were to be based on the results of an internationally-administered, questionnaire-based needs survey, and commissioned "trend-papers" presented at the Workshop(19).

However, in the event, the conference agenda was "thrown out of kilter" in what turned out to be a positive way. After an initial working party on the "concept and philosophy of environmental education" there was scheduled a plenary session designed to "pull the threads together" in a synthesising but uncontroversial way. Instead, a Latin American delegate succeeded in opening up a debate on the issue "the environmental situation" -- the context in which the conference was planning environmental education. A number of political elements arose in this

debate, including the notions of "developed/developing countries" and "aid" between countries. The debate raised the profile of some of the issues discussed at Stockholm and resulted in what Fensham -- an Australian delegate -- later described as "an incredibly creative situation"(20). Thanks to the persistence of the Latin Americans and the flexibility of the organisers (led by Stapp), a two-day hiatus in the intended formal proceedings of the conference allowed the more or less spontaneous expression of a groundswell of international community opinion and resulted in the development of an unanticipated, emotionally strongly-supported document, the Belgrade Charter. The initial statement of the Belgrade Charter is entitled "Environmental Situation", and captures the political edge which most delegates apparently saw as essential to the notion of environmental education they were to underwrite(21). For example, there is a comment seemingly directed at the issue of "developed / developing countries" (one which could be construed as having implications of a political nature):

It is absolutely vital that the world's citizens insist upon measures that will support the kind of economic growth which will not have harmful repercussions on people -- that will not in any way diminish their environment and their living conditions. It is necessary to find ways to ensure that no nation should grow or develop at the expense of another nation and that the consumption of no individual should be increased at the expense of another individual.

An even sharper perspective on the political issue of defence spending is also included in the Charter:

Above all, it (a prescribed "new global ethic") will demand the assurance of perpetual peace

through the coexistence and cooperation between nations with different social systems. Substantial resources for reallocation to meet human needs can be gained through restricting military budgets and reducing competition in the manufacture of arms. Disarmament should be the ultimate goal.

When the more formal agenda of the conference were resumed, the spirit of critique and negotiation remained. Each of a number of working groups was charged with the tasks of commenting on a draft "trend paper" placed before it, and making recommendations to plenary sessions for ratification as recommendations of the workshop(22). The "trend papers" before each working group had been prepared by "environmental education experts" selected by UNESCO, and purported to describe the worldwide state of the art in environmental education, yet in the working group discussions, assumptions underpinning many of the "trend papers" were strongly questioned. For example, the "trend paper" on evaluation in environmental education(23) was prepared by Dr. Dean Bennett, of Maine, U.S.A. Dr. Bennett was a graduate of Professor Stapp's doctoral program at the University of Michigan, and was selected by Dr. Stapp in his position as head of the UNESCO Secretariat to prepare the evaluation "trend paper". An Australian participant in the "evaluation" workshop, Peter Fensham, had this to say in a later report to Australia's Curriculum Development Centre:

Of the workshops I attended, the one on evaluation stood out as most fruitful. Dean Bennett...prepared a careful and provocative trend paper. It is a most valuable source of references on evaluation in Environmental Education. On the whole it was couched in terms of the hypothetico-deductive or empirical models of evaluation but we were able in the workshop

freely to discuss the appropriateness of this model and several others which were offered. It was good to have such a receptive author and the group -- smaller than a number of others -- functioned well(24).

The Belgrade Charter, probably the most widely read outcome of the Belgrade Conference, contains elements (for example, the section on the "Environmental Situation") which are at first glance descriptive but which on closer inspection can be seen to be shaped by a number of divergent interests. On the other hand, much of the Charter is openly prescriptive -- it is essentially an internationally formulated policy statement for the environmental education movement. The key prescriptions embodied in the Charter are:

- * environmental education should consider the environment in its totality -- natural and man-made, ecological, political economic, technological, social, legislative, cultural and aesthetic;
- * environmental education should be a continuous life-long process, both in and out-of-school;
- * environmental education should emphasise active participation in preventing and solving environmental problems;
- * environmental education should examine major environmental issues from a world point of view, while paying due regard to regional differences;
- * environmental education should focus on current and future environmental situations;
- * environmental education should examine all development and growth from an environmental perspective;
- * environmental education should promote the value and necessity of local, national and international co-operation in the solution of environmental problems(25).

To the extent that the Belgrade Charter has acted as an influential policy statement in the environmental

education movement, the Workshop responsible for its development earns "landmark" status in this discussion.

Following the Belgrade Workshop, the UNESCO/UNEP program moved into a phase of consolidation. An international information exchange network was set up with the establishment of the newsletter "Connect". Regional meetings were convened in all five continents to examine the recommendations embodied in the Belgrade Charter and adapt them to regional needs. Like the Belgrade Workshop, the regional meetings brought together experts in environmental education in order to advise UNESCO on the continued implementation of its Programme. In reviewing those statements in the Belgrade Charter which presents the goals and objectives for environmental education there were, according to UNESCO, no major disagreements with the spirit of the statements at any of the regional meetings -- for example, the "objectives" statements and the list of "guiding principles of environmental education programs" were considered at all regional meetings as being "valid"(26).

The regional meetings were also seen as a form of preparation for the next major international conference on environmental education to be held in 1977. This was held at Tbilisi, U.S.S.R., in October 1977. Only official delegations from United Nations Member States and organisations recognised by the United Nations attended the Tbilisi Intergovernmental Conference. Some 70 countries were represented. The stated purpose of the

conference was to arrive at recommendations for actions which might be undertaken at the national, regional and international levels for the promotion and development of environmental education(27). The Tbilisi conference was a landmark in the environmental education movement in that it constituted a more formal, intergovernmental recognition and reaffirmation of the concept of environmental education developed at Belgrade. The perceived legitimating quality of the conference is conveyed in the statement by the former head of the UNESCO/UNEP Environmental Education Programme secretariat that "the adopted policy recommendations of the conference are for all practical purposes binding on the member states (countries) and organisations present"(28). The main substantive agenda items considered by the Tbilisi conference were:

- * major environmental problems in contemporary society;
- * the role of education in facing the challenges of environmental problems;
- * current efforts at the national and international levels for the development of environmental education;
- * strategies for the development of environmental education at the national level:
 - (a) general education of the public through formal and nonformal education;
 - (b) environmental education (including in-service education) of particular professional groups whose actions and decisions have implications for the environment;
- * regional and international cooperation for the development of environmental education: needs and modalities(29).

As can be seen from this list, the "role of education" figured prominently in the thinking of the conference organisers. To support conference proceedings related to this agenda, the organisers developed a working document on "current efforts at the national and international

levels for the development of environmental education"(30). This working document was based substantially on deliberations in and surveys of the "five regions" in which UNESCO meetings occurred between the Belgrade and Tbilisi conferences. This document is useful in the present discussion because it provides an international perspective on efforts made and difficulties encountered in developing environmental education in the period between the Belgrade and Tbilisi conferences.

Comments made about efforts in formal education include:

* Efforts (at environmental education development) differ considerably in their intensity and nature from one country to another, being focused on all or some of the following aspects... inclusion of environmental topics in education, training of the personnel required for the development of environmental education, teaching materials, research and establishment of a national institutional framework for environmental education.

* As regards the content of curricula comprising environment-related topics, the following general trends are to be noted: in most regions, where formal education is concerned, priority is given at pre-primary and primary levels, to the natural environment, although several programmes exist in each of the regions bearing upon the social environment. At secondary level, the content of environmental education seems to conform very much to the same pattern and there is a tendency for it to be incorporated into traditional disciplines, such as biology and geography.

* Environment-related topics are generally dealt with in the framework of specialised disciplines; no attempt is made to give them an interdisciplinary character or to foster problem-solving or contact with the community outside the school.

* Relatively few efforts have been made in any of the regions to supplement the traditional training of teachers, organisers of educational activities and educational administrators with a view to producing competent staff for environmental education...In the five regions, environment-related topics are generally included in the training of biology and geography teachers for formal education. In such cases, the main emphasis is on the principles of the conservation and protection of nature, generally at the stage of pre-service rather than in-service training.

* In every region, the existence of large quantities of teaching materials for environmental education has been observed. The most common are those produced for the traditional formal sector of education: books and

textbooks written for courses specifically centred on the conservation of nature and which, not taking account of the interactions between the social and natural factors of the environment, continue to deal with it in a compartmentalized manner.

* The role of applied research in environmental education should be to remedy the shortcomings and gaps in (environmental) education. Although only very few activities have so far been undertaken in this field, in all regions there are signs of a will to carry out research on certain particular points...Some countries tend above all to carry out research on teaching materials in support of environmental education programmes in the formal and non-formal sectors.

From these comments made by UNESCO about efforts in environmental education may be discerned a number of key influences originating within institutional education and which appeared to be shaping the development of formal environmental education. According to UNESCO, problems relating to the interdisciplinary nature of environmental education stem from the fact that environmental education is "often dispensed within the framework of separate disciplines and thus presents a distorted and incomplete picture of the complicated nature of mutual interactions and influences which determine environmental issues". The notion of the school as a self-contained entity, isolated from society, is seen as contributing to difficulties in developing a community orientation in environmental education. New teaching approaches are seen as necessary for the adoption of "a problem-oriented approach proper to environmental education". The UNESCO document also cites institutional problems: "the lack of adequate co-ordination, both horizontal, between the various institutions, and by topics, between the various disciplines, makes the interdisciplinary approach to environmental problems, the only approach which would be

effective, very difficult". "Pedagogical difficulties" cited by UNESCO include the unsuitability of teaching materials to the local environment, and the effect of "rigid timetables" which "rule out the possibility of any interaction between teachers in the different disciplines and allow pupils little time to take part in exercises aimed at solving specific problems affecting the life of the community". The "traditional methods of assessment of scholastic performance" are seen as inappropriate to the task of assessing personal development in environmental education.

This recognition by the international environmental education community in 1977 that conventional structures and practices within institutional education can act as strong shaping influences on formal environmental education makes interesting reading in the light of the most recent (October, 1984) international environmental education conference. This conference, while not sponsored by UNESCO, was nonetheless a truly international conference in Canada (organised by the North American Association for Environmental Education). Conferees developed a "Banff Declaration", in which concern was expressed about the relationship between the current emphasis on "back-to-basics" education and the spirit of environmental education. The Banff Declaration states, in part:

Twelve years after the United Nations Conference on the Human Environment held in Stockholm in 1972, it is evident that the overall quality of life for vast numbers of people is now worse than it was, and that the state of the global

environment continues to deteriorate. Therefore, we, as environmental educators, affirm that current educational approaches and the back-to-basics movement in education will fail to meet the needs of humanity unless we begin at once to address the serious environmental concerns that presently face every member of the world community(31).

The Declaration proceeds to urge for "an unprecedented effort of educators throughout the world to restructure their entire educational programs, to meet effectively the urgent needs of humanity and the planet". The continuing concern of the international environmental education community about the relationship between the characteristics of institutional education and environmental education suggests that the environmental education movement has yet to come to terms with this issue.

What was incongruous about the Tbilisi conference is that while Stockholm, Belgrade, the regional workshops, and Tbilisi were all components in a planned, coherent UNESCO program, and the Belgrade Charter was such a significant outcome of Belgrade (and later endorsed at regional meetings), the Belgrade Charter was not included in the documents forming the basis of discussion at Tbilisi. In Fensham's view, the Charter was perceived as being simply too political in its tone for the Tbilisi gathering, given that conference's inter- governmental character(32). For whatever reason, the latter conference's "Tbilisi Declaration" included a set of goals, objectives and guiding principles (33) which bear striking similarities with those developed at Belgrade and

presented in the Belgrade Charter, yet the Charter itself was not included among the Tbilisi conference's briefing papers, and an analogous statement about the "Environmental Situation", with its political touches, was not endorsed by the Tbilisi conference.

By 1978 the UNESCO-UNEP International Programme on Environmental Education had been responsible for a series of activities and a set of policy-like documents which served to establish a language for the movement -- a language which contained a number of perspectives on the environment and on environmental education. This language was to influence activities at the national level over succeeding years(34).

The United Nations has adopted a lower profile in environmental education since 1978. However its influences began to permeate activities at the national level before that date, and have continued since. Some of the developments in environmental education at the Australian national level since the commencement of the UNESCO-UNEP program will be considered in the next chapter.

NOTES

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9. See for example Hancock, J. "Environmental problems and the reunification of the scientific community". In Fuller, W.(ed.) (op. cit - see note 8).
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12. Fensham, P. "Stockholm to Tbilisi" -- the evolution of EE". Prospects VIII (4): 446-455, 1978.
13. Fensham, P. Personal communication. (A taperecorded interview conducted on 1 May 1984 at Monash University).
14. Professor W.B.Stapp, former head of the UNESCO Secretariat in EE in Paris, illustrates the origins of the nature study and outdoor education movements as residing in the liberal-progressive educational philosophies of Dewey, Whitehead, Rugg, Counts, and Parker in the period 1900-1940. See Stapp, W.B. General Evolution of Educational Thought. University of Michigan mimeograph, 1982.
15. Fensham, P. (op. cit - see note 13).

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20. Fensham, P. (op. cit - see note 13).
21. The Belgrade Charter, together with draft versions and an account of the developments at the Belgrade Conference which yielded the document, are included in Fensham, P. A Report on the Belgrade Conference on Environmental Education. Canberra: Curriculum Development Centre, 1976.
22. Fensham, P. (op. cit - see note 21).
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25. Euelefeld, G. (op. cit - see note 17).
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28. Stapp, W.B. (op. cit - see note 18).
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30. This working document is Chapter III of UNESCO, Education and the Challenge of Environmental Problems. (UNESCO/ENVED.4). Paris:UNESCO, 1977.
31. The Banff Declaration. Developed at the 13th Annual Conference of the North American Association for Environmental Education, International Perspectives in Environmental Education: Issues and Actions. Banff, Canada: 5-9 October, 1984.
32. Fensham, P. (op. cit - see note 13).
33. See Jeske, W. (op. cit - see note 29).

34. For example, national-level activities influenced by either the Belgrade Charter or the Tbilisi Declaration include:

* The Australian Curriculum Development Centre's Environmental Education Project (see C.D.C. Environmental Education: A Sourcebook for Primary Education. Canberra: Curriculum Development Centre, 1981).

* The U.S. National Leadership Conference on Environmental Education (see Stapp, W. From Ought to Action in Environmental Education. Columbus, Ohio: SMEAC, 1978).

* The U.S. First National Congress for Environmental Education Futures: Policies and Practices. Burlington, Vermont, August 1983.

Preamble

Just as the consideration of international developments in environmental education presented in Chapter 3 was loosely organised around the UNESCO-UNEP environmental education program, this consideration of national (Australian) developments in this Chapter will focus on the activities of the Curriculum Development Centre (C.D.C.) in the 'seventies and early 'eighties. To some extent, this choice of focus excludes other relevant development work by schools and State education systems, but the choice is justified by the overwhelming significance of the C.D.C work as a national effort which attracted the support of a large number of Australian environmental education people. Moreover, the C.D.C work in some ways represents the "official" face of Australian environmental education, being explicitly supported by the States and directly related to Australian participation in international environmental education forums.

In 1979, the author undertook a C.D.C-sponsored evaluation of its "Investigating the National Estate"(1) and "Environmental Education Project"(2) materials focusing in particular upon the curriculum model and project operations involved in their development and dissemination, and the ways in which the materials were used by practitioners. The evaluation reports(3) yielded by this work, together with reports of more recent research, will form part of the accounts developed in this

Chapter and will be treated as "archives" for the arguments of later Chapters.

4.1 Environmental Education in Australia: Pre-C.D.C.

Education in Australia through to the early 'sixties was largely in the hands of State Education Departments. Courses of study in schools were determined by state curriculum committees for each subject. Federal involvement in education was minimal until 1963, when the Menzies government -- perhaps reacting to a near defeat at the hands of the Australian Labor Party which had made educational funding an election issue -- injected funds into Australian secondary schools in the form of capital funding for "Commonwealth Science Blocks" (laboratories and facilities). Federal interest in education continued with the Holt government's promise in 1966 to establish a federal Department of Education and Science. Smart describes the shift in government thinking on involvement in education:

Holt's promises reflected the broadening and deepening of federal involvement in Australia's education and confirmed an emerging Commonwealth pattern of assistance...The creation of a department in an area in which it had, until recently disclaimed any responsibility, underscored its changing views on education(4).

Federal funding of Australian education continued in 1968 with assistance for secondary school libraries.

To this stage, federal involvement had been mainly at the level of capital grants for buildings. In 1969, for

the first time, the federal government ventured into the area of curriculum development with the Australian Science Education Project (ASEP). This was a joint curriculum development project between all States and the Commonwealth. As Greenall notes:

one of the successes of ASEP was to demonstrate that States could cooperate in preparing curriculum materials and that such materials could have relevance and applicability across State borders(5).

Thus ASEP was an important landmark in the pre-history of environmental education in Australia because it foreshadowed a model of curriculum development involving a number of the States as well as the Commonwealth -- a model that was later to be used in the large-scale Environmental Education Project, and it legitimated the founding of a Commonwealth curriculum development body (while continuing to recognise the important role played by State education organisations). In fact, the notion of such a central organisation was embodied in the ASEP proposal

The proposal acknowledged that a skilled body of curriculum developers could form the beginning of a centre geared to review and amend the original science materials, and to undertake further curriculum developments in science or other school subjects(6).

Commonwealth involvement in education had, to this stage, been tied largely to science education. The consistent urgings from such bodies as the Australian Science Teachers Association and the Australian Council for Educational Research for Federal funding of science education in the 'sixties reflected similar pressures and

activities in the United States, where, since the successful launching of Soviet Russia's Sputnik One in 1957, the "clamour for funds to confront the spectre of superior Soviet Technology has hardly abated"(7).

Ironically, while concerns about the quality of training of technologists and scientists may have been a factor in the pressure for Commonwealth funding of science education in Australia, the worldwide concern about "the environmental crisis" -- a crisis popularly attributed, in part at least, to blind technology and the pioneer spirit -- was also felt in this country. In 1970, the Australian Academy of Sciences held a conference on "Education and the Environmental Crisis(8). The conference had two main aims:

- (i) to enquire into the extent to which educational authorities, especially in Australia, had responded to the perceived environmental crisis by introducing new educational programs;

- (ii) to bring about an exchange of views on the responsibilities of educational institutions and of the mass media in relation to environmental education.

Papers presented at this conference revealed a general lack of environmental education programs in Australian education; that is, at the same time as a need to respond to "the environmental crisis" was recognised, the shortcomings of appropriate responses in the form of environmental programs were also recognised. For example, O'Neill outlined the state of environmental education in Australia and concluded that although some conservation

education was included in primary schools in each State, there were no specific programs in secondary schools for environmental education in any State, and no environmental education was included in teacher training programs(9).

Thus, in 1970, two contending perspectives were current in the Australian educational scene:

- (i) a press for improved education, with federal assistance, in the area of science and technology;
- (ii) a concern about the "environmental crisis", and a specific concern about the lack of educational responses to this crisis.

According to Smart(10), public concern about Australian education probably reached a zenith in 1972, and amounted to an "educational crisis" in its own right. The new Australian Labor Party's response was (in part) to establish the Australian Schools Commission. A report from this committee (the "Karmel Report") made clear the Commonwealth government's position on curriculum development as one which, while recognising and encouraging educational initiatives at all levels, sought to establish a role for the Commonwealth in national curriculum development:

The curriculum, along with the teachers who are to devise and administer it, is central to any advance in the quality of education for Australian children...It is to this end of providing alternatives that curriculum development on a national scale would be supported by the Committee. It would supplement and not supplant State, local and teacher initiatives. The likelihood of more relevant curricula, greater integration, interdisciplinary approaches and coordination between primary and

secondary studies would be enhanced through national projects(11).

4.2 C.D.C. and Environmental Education.

The Curriculum Development Centre was formally enacted in July 1975, following a period of operation under an Interim Council which had been established in December 1973. Two years after its formal establishment, it appeared to view its raison d'etre in terms of the need for facilitation (cooperation and coordination), funding, and centre-periphery communication channels in Australian education:

Early in the 1970's there was seen to be a need for an Australian body to foster curriculum development, a national centre which could facilitate and encourage joint activities between public, denominational and private school systems, establish contact with curriculum development being carried out beyond Australia, and provide a focus and stimulus for curriculum development across the country. It was envisaged that such a centre would provide a variety of supports for curriculum development, including the funding and administration of joint projects and the dissemination of information(12).

The Karmel Report of 1973 contributed, with its reference to "curriculum development on a national scale" and "national projects", to a climate favoring the establishment of a national curriculum development centre as a national. But another, somewhat countervailing, trend was also evident in Australian education at the time: the trend towards school-based curriculum development (supported by union action in Victoria at least, and by the early 'seventies, in policy endorsement from such State systems as Victoria and South Australia). This

countervailing trend was taken up and encouraged in C.D.C. literature and initiatives. Malcolm, commenting on the period of the early 1970's, points out that

in Australian education, the Schools Commission was established and the Karmel Report advocated education guided by principles of social equality...and devolution of decision-making from the central state offices to the schools themselves. In contrast to the sixties, it was a time for school-based curriculum development, with opportunities for student choice of subjects and within subjects(13).

Given that the Curriculum Development Centre was born, in part, out of concerns about science education, the environmental crisis and educational responses to that perceived crisis, and contesting ideas of curriculum development (national projects vis-a-vis school initiatives), it is not surprising that environmental education curriculum development figured prominently in C.D.C. deliberations from the very beginnings of its operations(14), nor that (as we will see) the major C.D.C. environmental education project emerged only after some six years of internal debate about how a balance between school and central initiatives might best be achieved(15).

One of the early activities of the Interim Council(16) was consideration of a proposal for an Australian environmental education program submitted by the Australian Council for Educational Research (ACER)(17) to the new Australian government. The document originated from a recognition of national and international concerns about the environment, an issue in which the new Labor government had already expressed its interest. The

document cited a concern for environmental education expressed for the Commonwealth Government by the then Governor-General Sir Paul Hasluck at the opening of the 28th Federal Government:

The government recognises that the use of leisure in a modern society presents problems and opportunities involving profound questions of the relations between man and his community and man and his environment.

The ACER proposal suggested a number of guidelines for an environmental education program. Three of them were:

*environmental education involves a study of the historical, social, aesthetic, economic and scientific aspects of the environment, and thus encompasses a far wider field than the development of resources in any traditional discipline.

*environmental issues involve value judgements and it is therefore essential that a range of opinions be expressed.

*it is considered that environmental education is best served by integrated interdisciplinary studies which emphasize enquiry and a problem-oriented approach.

The structure proposed in the ACER proposal was for a "national centre for environmental education" and regional "resource development groups". The proposal saw the national centre as having two main functions:

(a) coordination of activities related to environmental education; liaison with local, national and international groups involved in environmental education and research; dissemination of appropriate information to schools and other organisations concerned with environmental education.

(b) development, trialling, evaluation and publication of resource materials.

At about the same time, R.D.Linke completed a national survey of environmental education in Australia sponsored by the Education Research and Development Committee, and submitted a report(18) on the survey to the Interim Council. The survey conducted by Linke received a contribution from Peter Fensham in the form of advice in defining, promoting and administering the survey.

The Linke report and the ACER proposal were key influences shaping the early C.D.C. deliberations on environmental education. Linke's report argued that a definition of environmental education ought to include three "essential characteristics":

- * the awareness of interrelationship between man and environment, and the understanding of both the nature and implications of human impact on the environment;
- * it is based on, and seeks to promote, a concern for the quality of human life;
- * to promote a personal commitment to, or acceptance of responsibility for, environmental conservation(19).

These characteristics were drawn from a number of definitions of environmental education, including the draft U.S. Environmental Education Act, and the definition proposed by the International Union for the Conservation of Nature and Natural Resources (I.U.C.N.)(19). Linke went on to argue for a "comprehensive curriculum in environmental education", assuming in his argument a "centre-periphery" position on educational reform -- one which favors big projects and materials development(21):

This if we accept the practical need for, and

characteristic definition of Environmental Education, then it follows from this that a major curriculum development program should now be established in Australia to meet the increasing need for appropriate resource materials, and through this to promote in a more systematic and comprehensive manner the important, and almost inevitable expansion of Environmental Education.

The Interim Council of C.D.C. formed a "Science Review Sub-Committee" to deal with a number of proposals it received in its early days. The ACER and Linke documents were forwarded to this sub-committee, demonstrating an early linkage of science and environmental education in the minds of the Interim Committee(22). Perhaps in recognition of the significance of proposed developments in the environmental education area, environmental education matters at the C.D.C. became the responsibility of an independent Environmental Education Committee(23) in December 1974. This committee's terms of reference included investigation into, and reporting on, the needs for environmental education in Australian schools; collections of feedback on this report; presentation of report and feedback to the forthcoming UNESCO seminar on "Education and the Human Environment" to be held in Melbourne in May 1975; and the preparation of a set of recommendations for C.D.C. action(24).

Arising from the work of the sub-committee, a needs survey was conducted by Annette Greenall, the secretary of the committee, and was based on personal interviews: "a total of 38 interviews involving 68 people from primary, secondary and tertiary education and environment groups were interviewed during the period November 13 to December

3, 1974(25). The interviews were structured around questions relating to the interpretation and acceptance of the I.U.C.N. definition of environmental education. This definition was by this time a central component in the Centre's language of environmental education.

An Interim Report of the Environmental Education Committee posited as a priority the need for teacher education in environmental education. An important area that was seen as being neglected was that of exchange of ideas among teachers. This emergent notion of the need for exchange was accepted as the focal point for C.D.C. involvement:

The intention of the Plan (an Action Plan proposed in the interim report) was to 'provide teachers with various forms of assistance in areas of specific need' through providing 'a network of professional expertise for teachers in each of these areas of need', such as local information and resources (through regional environmental education consultants and information centres), new curriculum materials and evaluation procedures. The assumption appears to be that if teachers were given access to consultants and opportunities to develop their skills, change their attitudes, increase their knowledge and to exchange ideas with other teachers then they would assist students to achieve the aims of environmental education(26).

Thus in its Interim Report, the Environmental Education Committee was responding to the perceived need for teacher education (in particular, for exchange of ideas among teachers) by recommending an important role for new curriculum materials and a supporting network of educational consultants. Further, at this time a set of aims of environmental education had been identified and accepted by the committee. It was felt that these aims

'...should be to develop within individuals:
(i) An awareness and understanding of the complex interrelationship between man and his total environment, and of the implications of human impact on the environment.
(ii) A concern for the quality of life, with all its variety of expressions.
(iii) A personal commitment to, and acceptance of responsibility for, environment conservation, and willingness to cooperate with others toward this end.
(iv) Achievement of abilities and attitudes related to solving environment problems and to dealing with unexpected or unpredictable changes in the human environment"(27).

The influence of the I.U.C.N. definition of environmental education, and of Linke's "three essential characteristics", is obvious in these aims.

The Environmental Education Committee envisaged the C.D.C. role as a coordinating (and financing) one, and yet the intention was for it to be cooperative and decentralised in its operation. The tension between coordination and cooperation was recognised at this time:

It was acknowledged that it (the Committee) was attempting to steer a difficult course between two extremes -- providing input from a central body to schools and using teachers, teacher groups and community groups as prime sources of information and ideas(28).

Key in the planned decentralised, cooperative operation was the proposed network of regional environmental education consultants, who were seen as providing a focal point for the flow of information. Here, too, there was potential tension: the tradition of consultancy at this time was one of one-way flow of theory, activity ideas, and materials from State-level and regional educational centres to teachers in schools; the flow of information

envisaged by C.D.C. was two-way, with consultants communicating ideas from teachers to the Centre and facilitating the dissemination of information from the Centre back out to schools.

The Environmental Education Committee of the C.D.C. formulated a proposal for the support of environmental education in Australia and published the proposal in an Interim Report which was "intended to provide a basis for feedback to the Committee through its consideration both at the Australian UNESCO Seminar...and by persons and organisations interested generally in environmental education"(29).

In fact, the UNESCO Conference (Melbourne: May, 1975), entitled "Education and the Human Environment", served two purposes in relation to Australian environmental education development. It served to provide feedback on the Environmental Education Committee's Interim Report; it also served as part of the lead-up and briefing to the (UNESCO) Belgrade Workshop. Thus C.D.C.'s environmental education activities were strongly interwoven with the UNESCO International Environmental Education Program outlined in Chapter 3. Continuity in this linkage was enhanced by the overlapping involvements of Professor Peter Fensham of Monash University in the UNESCO program and C.D.C. activities. Fensham was a member of C.D.C.'s Science Review Sub-Committee, Environmental Education Committee, and (later) the Environmental Education Study Group; he was also organiser of and participant in the

Australian UNESCO seminar, was supported by C.D.C. to attend the Belgrade UNESCO Workshop in October 1975, and (later) represented Australia at the Tbilisi Intergovernmental Conference at Tbilisi in 1977.

A number of issues for Australian environmental education was raised at the Melbourne UNESCO conference. Fensham, for example, spoke of a movement in education from "control to freedom":

it is a movement from an era when central or external control -- of curriculum, of programs, of teacher behaviour, and of pupils -- was characteristic, to a situation where all these aspects of schooling are expected in various ways to manifest freedom from this traditional control -- freedom in the curriculum, freedom for teachers, and freedom for pupils...In one sense, this movement in education is essential if certain aspects of environmental education are to have any chance of success(30).

Fensham's own view of environmental education at the time recognised the importance of the commitment of pupils to "action issues", and of the role of "conflict situations" in environmental education:

Another commonly mentioned goal of environmental education is the development of an awareness of, and a commitment to action in issues which involve people and are essentially man made. ..Environmental education is also concerned with conflict situations. If one is to be involved in problem-solving activities which involve the respective interests of an intricately interconnected set of people, then the experience of living and working in co-operation with other people should find some explicit expression in the experiences of learning for both intending teachers and for students(31).

Fensham's recognition that environmental education is concerned with conflict situations may have been

responsible for his choice, in his role as organiser of the conference, of Lawrence Stenhouse as visiting consultant. Stenhouse had previously worked with Britain's Humanities Curriculum Project, one which encouraged teachers to involve pupils in studies of controversial issues. Stenhouse was also an advocate of participatory, qualitative educational research and evaluation(32) -- a form that Fensham regarded as consistent with the "interactive" character of environmental education(33). (For Fensham, the definition of environmental education accepted by C.D.C. established humankind as an interactive part of the overall ecological system; in evaluation, human beings cannot be treated as being in some sense independent of their ecological content. A psychometric, quantitative view of evaluation is, in his view, inappropriate). Another tension was thus articulated at the time: that between "quantitative" and "qualitative" (and between agency-oriented and practitioner-oriented) forms of educational research and evaluation. Further, Stenhouse introduced into deliberations about environmental education such notions as curriculum as a dialectic between theory and practice ("curriculum is about educational ideas disciplined by practice and practice illuminated by educational ideas..."), a notion of the limits to which "good ideas" in curriculum materials can commend themselves to practitioners ("second-rate curricula can spread like a bushfire if they are well organised for dissemination. Brilliant ideas can just as easily founder"); and a non-technicist view of dissemination:

Dissemination must be founded upon a case for the autonomy of teachers. No curriculum which claims to be right or good or beautiful simply because it has been tested will succeed in the end, because the tendency of that claim is to overrule the judgement of the teacher...curriculum materials must be volatile, not static. Dissemination is not offering a curriculum to customers, but offering ideas through curricula to working groups(34).

Thus Stenhouse also began to articulate a tension between centralist and participatory views of curriculum, curriculum development, and curriculum dissemination and implementation.

Another issue for Australian environmental education was raised at the UNESCO conference by William Hall: he was concerned with the tendency to regard as synonymous environmental science and environmental education, a tendency which he claimed is illustrated by younger students' nature study excursions, and older students' field trips. Hall argued that environmental education ought not to remain within the province of science teachers, and cites three reasons why "the scientist must not be allowed to teach environmental education":

- * the nature of science education does not lend itself to environmental education;
- * the nature and training of scientists do not lend themselves to environmental education;
- * the contribution of science in important decision making is extremely small(35).

It is clear from this last reason given by Hall that in his view, environmental education is more about critical appraisal of environmental situations than the provision of information about environmental situations. His stated

belief "that the unique contribution of environmental education should be in the area of problem-solving and associated decision-making, which in turn should lead to a willingness to act" echoes the sentiments of the IUCN definition. In addition to these comments about environmental education itself, Hall sounded a note of scepticism about the traditional materials-based, centre-periphery view of educational change in which the centre is regarded as the innovator and those at the periphery (the practitioners) are regarded as technicians: Hall deprecates

the attitude of mind developed by teachers...whereby the Project is regarded as the innovator and the teacher is seen as the one who "tries it out" or, at best, contributes to the jigsaw by writing parts of the packaged deal...There are those who believe that teachers can be divided into two groups: the innovators and the followers. I do not hold this opinion. If there is any truth in the belief then it is the "system" which is to blame and not the teachers. It is precisely a breaking of this "system" which should be one of the major concerns of a Curriculum Development Centre, rather than the development of yet more books(36).

While not articulating a clear alternative to the centre-periphery model, Hall urged the C.D.C. to "investigate as large a variety of curriculum development models as possible".

Following the substantial response to the Interim Report from the UNESCO conference and other persons and organisations interested in environmental education, the Environmental Education Committee of the C.D.C. produced a revised Final Report. Among the major changes was the inclusion of greater flexibility of operation for the

regional environmental education consultants and their various specialist support services. Since these consultants were "medium-level" personnel in the respective State Education systems, this reaffirmation of the importance of their role was consistent with a lowering of the profile of the Centre and an increased emphasis on the activities that the States already had underway in the name of environmental education(37). However, the Committee saw C.D.C. as maintaining its overall coordinating, management role.

The Environmental Education Committee's Final Report was forwarded to C.D.C. Council (now no longer "Interim") in August 1975. The outcome was that although environmental education was still a priority area for C.D.C., no immediate action was taken on the report, which was referred to a Study Group for further revision. The Study Group(38) was established in November 1976. Given the priority status ascribed to environmental education by the C.D.C. at the time, a sixteen month delay is surprising. Further, the establishment of this additional step (establishment of a Study Group) in the process of getting down to concrete action can itself be interpreted as a deliberate "slow down" measure. Reasons given by Greenall for this deferment of action are:

- * a reduction in funds received from the federal government;
- * the view by the Australian Education Council representatives on the Council that the proposal was too ambitious;
- * the possibility that the States would have difficulty in meeting their funding commitments (eg. time release for consultants);
- * the creation by the proposal of a need for additional

staff (difficult given the funding cuts);
* a feeling by some Committee members that the proposal was too general(39).

The C.D.C. Study Group on Environmental Education began its operations in November 1976, with terms of reference that emphasised the elaboration of guiding statements which could foster school-based curriculum development in environmental education:

By placing the emphasis on curriculum programs there seemed to be an implicit assumption that the more expensive aspects of the earlier report -- the regional consultants and information centres -- were to be ignored in favour of more material-oriented programs...the emphasis at C.D.C. was now very much on assisting school-based curriculum development(40).

This shift in emphasis may well be explained by the fact that the newly-arrived (in 1975) Director of C.D.C. was Dr Malcolm Skilbeck, a staunch advocate of school-based curriculum development.

The Study Group amended the Environmental Education Committee's proposal and produced a discussion paper which was exposed for consideration by "all bodies interested in environmental education" including

State and Territorial education departments, other government agencies, teacher associations, tertiary institutions, community organisations, commercial and industrial organisations together with the public media and the Curriculum Development Centre(41).

The chairman of the Study Group was Professor Peter Fensham, demonstrating again a continuity of involvement in Australian environmental education, with membership of precursor C.D.C. committees and attendances at

international environmental education conferences organised by UNESCO.

The Study Group's report was completed and submitted to the C.D.C. Council in June 1977. The recommendations of this report are presented in full in Appendix 1. Of five priority areas identified in the report, two were concerned directly with materials development. These two priorities were concerned with the production of position papers and descriptive evaluations of existing environmental education, the initiation of discussion papers to assist teachers, the development of effective strategies for improving the skills of teachers, and materials development of an exemplary nature.

It is important to note that despite the fact that a central "perception of environmental education" had been evolving from the earliest days of C.D.C. deliberations -- with the input of Linke's three characteristics, Greenall's recommended adoption of the I.U.C.N. definition, and the influence of the Belgrade Conference mediated by Fensham's presence at Belgrade and chairmanship of the Study Group -- the Study Group's report did not explicate a perspective on environmental education in the form of a definition or a statement of aims. Thus there was no set of criteria which the reader could apply in making judgements about what counted as environmental education and what did not.

A key feature of the four years of central

deliberations about environmental education was the negotiation of perspectives underlying the evolution of ideas about the field and about an appropriate response in terms of curriculum development. This period showed interactions both within the membership of C.D.C. committees, and between those committees and contacts from schools, education departments, tertiary institutions, local, national and international conferences, information networks, and community groups. The inheritance that these four years of deliberation were to pass on to the later project team (those people actually charged with the responsibility of producing the "hard copy" of curriculum materials) was seemingly a conscious attempt -- with the influence of individuals such as Fensham, Hall, Stenhouse and Skilbeck -- to do something different in curriculum development. Reflecting on this situation, Annette Greenall, a member of almost all of C.D.C's environmental education committees, makes the comment that

In many ways the Action Plan (produced by C.D.C's Environmental Education Committee and revised by the Study Group) was putting forward a new model of curriculum development in an attempt to meet the needs and characteristics of environmental education(42).

In short, the model sought to preserve a meaningful role for the central agency while recognising the need for direct involvement of teachers in materials development.

Two of the concrete, curriculum materials-type outcomes of the Study Group's recommendations were the Investigating the National Estate package, and the Environmental Education Project materials. An account of

each of these outcomes will be provided here by presenting abridged versions of two evaluation reports compiled by the present author on the basis of two C.D.C-sponsored studies over the period 1979-1983.

4.3 "Investigating the National Estate"

Introduction

Recommendation 3.5 of the Study Group's report prescribed that "the Curriculum Development Centre produce a kit of materials, for use in upper primary and lower secondary schools which will assist teachers and students to participate in the Australian Heritage Commission programs". This kit of materials was jointly funded by C.D.C. and the Australian Heritage Commission, and was published in 1980. In June 1980, the C.D.C. approved the funding of a proposal by Deakin University for the study of dissemination and implementation of the kit, entitled Investigating the National Estate (INE). As the kit was published by the time the study began, the study did not embrace the workings of the project team responsible for developing the materials. The present author was Chief Investigator for the study(43).

The overall aim of the INE study was "to gather and present information and arguments from a range of perspectives which can inform action in relation to the dissemination and implementation of the Investigating the

National Estate materials". More specifically the study's "intensive phase", which focused upon implementation issues, was concerned with such questions as:

"How, and at what level, are the materials used?"

"What aspects of the materials are most popular?"

"What teaching strategies are employed?"

"What problems do teachers encounter in implementing the materials?"

"How do the materials relate to existing curricula?"

The methodology for addressing these questions included questionnaire survey, document analysis and action research. In the notion action research, teachers using the materials were assisted in submitting their own practice to systematic review and reflection through the critical examination of the effects of their own strategic action. The key elements of an action research approach were conceived at that time to be:

- (i) to identify implementation issues of mutual interest to participants;
- (ii) to investigate these issues through the teaching practice of participants;
- (iii) to reflect on the various consequences of putting alternative strategies into practice;
- (iv) to apply the sequence of issue identification, planning, action, and reflection in a cyclic fashion, over a relatively protracted period of time(44).

A "cluster-based" action research and development model(45) was adopted for the study of the Investigating the National Estate materials. Cluster-based action research is so-called because it brings together a group of participants, usually comprising representatives from a number of schools, and usually with three or four teachers from at least one of these schools. This creates the

possibility of a critical community (46), in which a number of independent perspectives can be brought to bear on a single issue or problem.

It was intended in this study that the methodology not only be productive in terms of generating information and gathering perspectives relating to the specific substantive field of environmental education and the more general field of educational innovation, but also that it be introspective in the sense of enabling reflection on the appropriateness and efficacy of the methodology itself. Action research is not a "tried-and-true" approach to research in the field of environmental education -- or even in education in a wider sense: the generalisability of action-research methodology was a basic issue to be regarded as problematic in the INE study. Hence it was intended that in the course of applying the cluster-based action research model in this study of dissemination and implementation of environmental education materials, attention would be paid to the issue of whether studies of environmental education innovation can be fruitfully mounted on a model of action research. The study, then, had a dual focus -- it was concerned with substantive issues in the field of educational innovations; and it was concerned with issues to do with a methodology by which teachers and others may become informed about those substantive issues.

Structure and Process of the Study

The action research component of the study of the INE materials was organised around monthly meetings of a "cluster" of fifteen teachers representing five post-primary schools in the local Geelong area(47). Three government schools (a high school, a technical school, and a technical-high school) and two non-government schools participated.

This variety of participant background permits a number of positive outcomes: the identification of issues or problems of a common nature (that is, with incidence in several schools); the formation of a "critical community" in which a number of independent perspectives could be brought to bear on a single issue or problem; cross-school support , with the possibility of interschool exchange of "solutions" to common problems.

In addition to multiple school participation, four of the five schools were represented by more than one teacher. This multiple representation provides a basis for mutual support and self-reflection within schools -- for example, during implementation in the periods between cluster meetings.

Teachers were invited to implement the materials in whatever way they believed best suited their particular setting. Implementation of the materials took place in classes from Level 7 to Level 10. No school attempted to

implement all Units of the kit. No implementation guidelines were issued other than those existing in the kit itself. Guidelines were provided, however, for self-monitoring and reporting on the kit-related activities in the schools.

"Cluster" meetings were organised on a monthly basis for the purposes of reporting back on forms of implementation, and co-operative analysis of implementation issues. The reporting phase, in which participants presented a verbal or written descriptive account of their implementation experience, was designed to fulfill two functions. Firstly, the description of implementation in one setting by a given participant served to present other participants with an implementation model for consideration and possible application in their respective settings. Secondly, in several cases, a report compiled ostensibly as a description of implementation also served as a concrete exemplar of an issue of interest or concern to the group as a whole.

The analytic aspect of the cluster group activities centred around issues or problems of mutual interest to members of the group. The approach was simply to invite individuals to identify problems about the kit -- either verbally or submitted in written form -- and to develop a list of issues of mutual concern to act as a framework for discussion at cluster meetings. A typed pro forma version of this list was distributed for comments at each monthly meeting and the feedback obtained enabled the

monitoring of changes in perceptions of implementation issues.

This mechanism operated to maintain the focus of the cluster meetings on issues or problems "owned" by participants. Further, any action on these issues was determined and executed by participants -- the assumption being that changes in curriculum or teaching practice are the responsibility of the teachers and schools.

Participants engaged in a range of activities in the between-meeting periods, including implementing aspects of the kit, self-monitoring and reflecting, contributing to reports on implementation and on implementation issues arising, and reading and commenting on cluster meeting "proceedings" and reports by other participants.

Between-meeting activities for the researcher-facilitator included visits to schools, observation of implementation, interviewing participants, document analysis, maintaining records of proceedings, co-authoring of reports, and generally maintaining contacts within the group.

The intention in this phase of the study was primarily to develop a structure in which participants were engaging in critical discourse about the innovation itself, their teaching practice, and the relationship between the two. An eclectic approach to data gathering was adopted

including direct observation, informal and formal (recorded) interviews, group discussion, document analysis, and questionnaires.

As outlined above, participant reports (verbal and written) were key elements of the process. The reports were both a means of establishing a concrete base for discussions about issues, and ends in themselves as descriptive accounts of the materials-in-use. Accounts of how the materials were successfully used served the interests of the sponsors as much as analysis of such issues as implementation problems and the relationship between the materials and existing curricula.

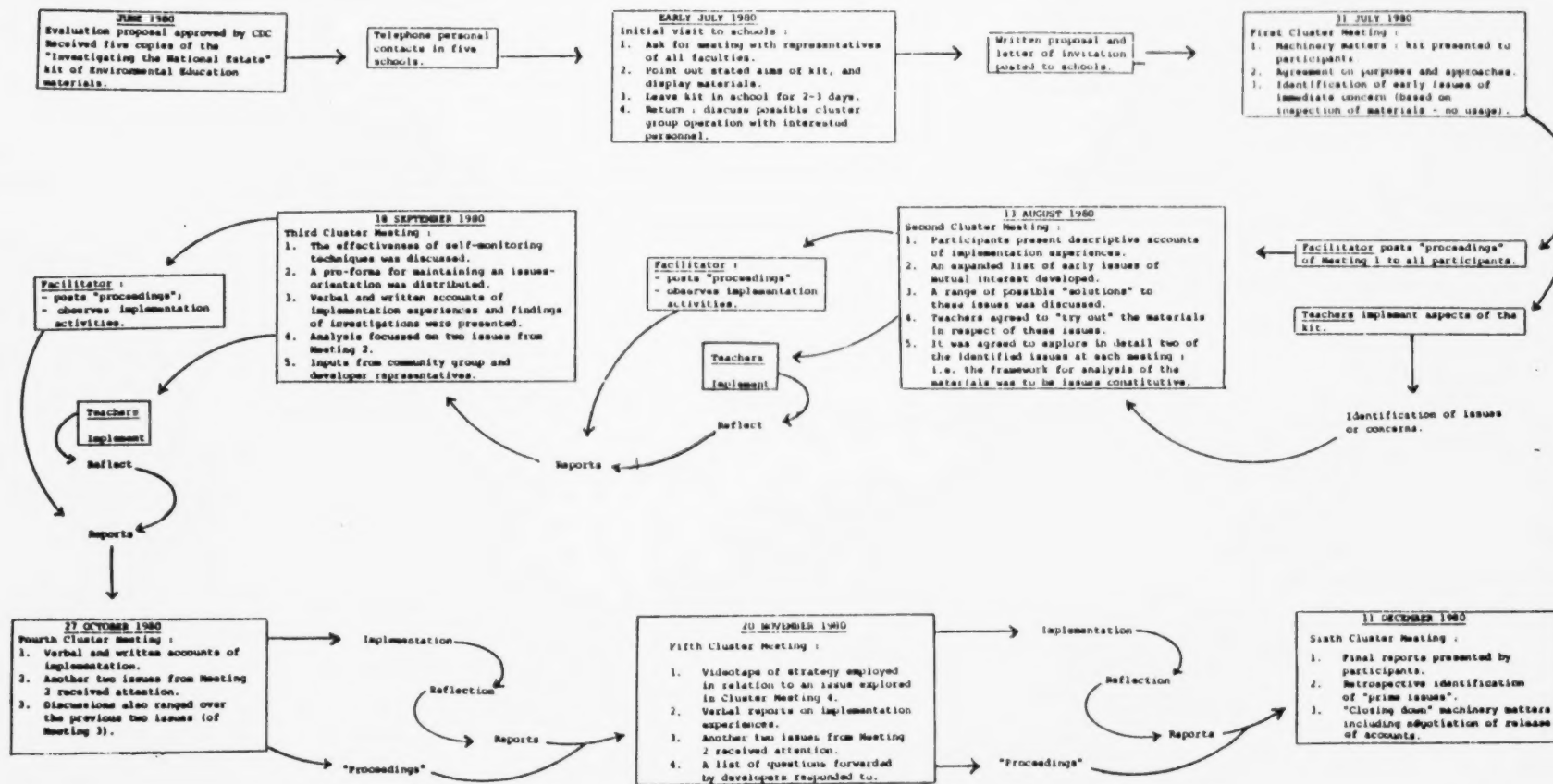
A diagrammatic summary of the "Investigating the National Estate" study is presented in Table 1.

The first cluster meeting was concerned initially with "machinery matters" -- the frequency and duration of meetings, type of reporting, role of the facilitator, the principles of procedure under which the study would operate, and the relationship between school-based participants, Deakin personnel and personnel of the Curriculum Development Centre. A representative of the Centre spoke to the cluster group about the background of the "Investigating the National Estate" kit and raised a number of issues for the group to consider. Subsequent discussion centred around four issues of immediate concern:

- (i) the timing of release of the kit;

TABLE 1

STUDY OF IMPLEMENTATION OF "INVESTIGATION THE NATIONAL ESTATE"



- (ii) the form of presentation of the kit;
- (iii) the readability of the materials;
- (iv) the relevance of the examples (for instance, the illustrations) to local settings.

The second meeting was influential in identifying the issues which were to loom large in subsequent meetings. Meeting 2 commenced with school-by-school accounts of experiences in implementing the materials. Participants' responses to an invitation to identify their early concerns about the materials resulted in a list of implementation issues regarded as being of sufficient mutual interest to serve as a framework for discussion in this and later cluster meetings.

The problem of how to improve the effectiveness of self-monitoring and reporting was addressed early in the third meeting. Guidelines for self-monitoring and reporting were distributed and discussed. Verbal and written reports of experiences with the materials were presented by practitioners and two issues embedded in these reports were analysed at length.

A number of comments passed at the third meeting created an impression that participants were feeling apologetic about the level, or the nature, of implementation of the INE materials in their schools. The feeling seemed to be that there must exist an ideal, preferred level or form of implementation, and that the diversity of approaches being described at our meetings

were evidence of a state of affairs that was in some sense unsuccessful, improper or undesirable. These feelings prompted a discussion of views of "innovation" -- in particular the relative status of the interests and views of developer and school-based practitioner. A consideration of some generalisations about innovation derived from the literature revealed that several of these generalisations were being instanced in the experiences of cluster members -- that is, their problems and concerns were not to be dismissed as merely idiosyncratic, but rather were particular expressions in particular circumstances of more generally occurring issues in educational innovation.

The remaining meetings were concerned with addressing issues identified early in the study. Discussions were both descriptive -- of participants' experiences with the materials -- and issues-oriented. Participants reported verbally, in written form, and through the use of videotape. The original list of issues expanded as participants became more informed about the materials through their own practice.

These issues are referred to here, in outline form and without further explanatory or interpretive comment(48).

1 Although the INE kit is initially seen as a student resource, as implementation proceeds, participants' views of the kit change and the kit is seen increasingly as a resource for teachers.

1.1 The materials create expectations of reading level suitability of Units 2, 3 and 4 to "lower secondary" students.

1.2 The readability level of much of the materials is higher than "lower secondary".

- 1.3 Perceived readability problems are causing teachers to modify and even reject some of the material for student use.
 - 1.4 The lack of contextual relevance of the material detracts from their appeal and effectiveness.
 - 1.5 Teachers need to fit the materials to their own geographical locality.
 - 1.6 There are insufficient independent inquiry activities for students.
 - 1.7 The packaging/presentation form of the kit is not designed for extensive student use.
- 2 While the aims of the kit are interdisciplinary, the structure of the kit invites a disciplinary orientation which detracts from the development of the aims.
- 2.1 The aims of the kit are concerned with the development of environmental awareness and of environmental decision-making skills.
 - 2.2 In Unit 1, a view is developed of the process of "Investigating the National Estate".
 - 2.3 The kit's aims and process are interdisciplinary.
 - 2.4 The structure of the kit invites a disciplinary orientation.
 - 2.5 This subject-related appeal of Units 2 - 4 of the kit detracts from their long-term effectiveness in stimulating interdisciplinary work.
- 3 A more specific issues-investigation approach may reassert the priority of the interdisciplinary INE aims.
- 3.1 The priority of the INE aims needs to be established.
 - 3.2 An issues-investigation approach is consistent with the INE theme.
 - 3.3 The Grovedale Technical High School experience provides an example of an issues-investigation approach.
- 4 The process of implementation of the INE kit manifests a number of common characteristics of educational change.
- 4.1 The innovation is adapted during implementation.
 - 4.2 The innovation process is political.
 - 4.3 The innovation imposes on implementers demands for changes in teaching practice.
 - 4.4 Teachers may tend to assume that there is a fixed, ideal, preferred level or form of implementation, particularly when the innovation is manifested as a discrete package like the INE materials.
 - 4.5 The innovation creates an evolving demand for resources and information.
- 5 The current dissemination strategy, in practice, is providing little opportunity for dialogue about the materials.
- 5.1 The planned dissemination strategy has the potential for establishing an on-going dialogue between implementers and implementers and developers.
 - 5.2 The dissemination strategy is effective in locating the "product" -- the kit of materials -- into schools, but provides little opportunity for

two-way face-to-face dialogue between developer and implementer.
6 The cluster-based action research and development model is a potential dissemination strategy.

Reflections on the INE Study

(a) About Environmental Education: Conditions for Survival

The main issue associated with sustaining the INE materials as an innovation centres around the need to maintain an interdisciplinary orientation. The intention of the developers is clearly that the activities of Units 2 - 4 contribute to the achievement of the interdisciplinary aims of the kit, and to the development of the "National Estate concept of Unit 1. However, within the context of the Geelong cluster group, it became clear that there is a danger that this intention may not be translated into reality. For example, Unit 1 of the kit was scarcely used. The materials of Units 2 - 4 fulfilled a service function to established programs in Art, History and Science, in most cases. The trend was for the materials to be implemented, or informally evaluated by practitioners with implementation in mind, in settings which assumed and maintained the priority of the aims of existing subject-based programs. The strength of commitments to existing subject-based programs seems to have been sufficiently great for the materials to have been put to use in the service of disciplinary rather than interdisciplinary aims. The source of guidelines for implementation tended to be current subject-based teaching

practice. (It must be remembered that, in the case of the Geelong cluster group, strong commitments to existing programs existed before the CDC materials became available for use). Furthermore, evidence emerged from discussions with cluster group members that discipline-oriented usage of these materials soon led to non-use -- that materials used in this way were not effectively meeting teachers' needs. The feeling was that materials designed ostensibly to serve interdisciplinary programs can be "found wanting" when stacked up against topic supporters designed exclusively with a given subject-area in mind -- that is, they may be out-competed in the not-so-long term. What seems to be required is a status reversal, where instead of the INE units being regarded as fulfilling a service role to disciplinary programs, the discipline-based subjects act as tools (via the type of activities in Units 2, 3 and 4) in serving the "National Estate" concept of Unit 1. Unit 1 appears to be crucial to the sustained usefulness of the kit. This status reversal was not achieved for the participating teachers.

This problem, expressed here in relation to the INE kit materials, is also of critical importance in the broader context of "environmental education through the disciplines" -- that is, environmental education as an integral, non-appendage curricular component; not a new subject, but as approach which permeates through existing subjects. Put simply, the problem centres on the need to operationalise an interdisciplinary approach per medium of disciplinary subject areas.

The extent to which the maintenance of an interdisciplinary orientation is a problem is clearly determined in part by the strength of the subject boundaries in the innovation setting. The interdisciplinary condition may be easier to achieve in a primary school, and in those secondary schools where subject boundaries assume a low profile (for example in two- or three-year-old schools offering only lower secondary education). In settings where subject boundaries are pronounced, then for the interdisciplinary INE innovation to be sustained, implementers may need to employ their subject area as a vehicle for achieving INE-related aims.

In the Geelong cluster group operation, one approach which seemed to succeed in establishing the priority of INE aims over disciplinary (subject) aims was an "issues-investigation" approach. The main elements of the approach as it applied in an urban Geelong setting are presented below(49).

1 INE cards were employed as "stimulus material", and to sharpen students' observation abilities.

2 A "local history tour" was conducted through the nearby environment of the school.

3 Students and teacher/s collaborated in identifying an issue of mutual concern.

4 Teachers elicited the independent input of opposing perspectives on the issue by local informed participants in the issue.

5 Students operated in groups to develop a presentation and defence of the respective perspectives in a debate situation.

6 Students negotiated a "plan of action" in respect of the issue.

These views are the elements of an approach which in the participants' view "worked" in establishing an "investigating the National Estate" orientation, that is in contributing to the interdisciplinary aims of the kit.

The relationship of this approach to the "Investigating the National Estate" theme of the materials is that an environmental issue is used as a vehicle for studying the process of "investigating the National Estate".

Probably the greatest barrier to a sustained INE (or more generally, environmental education) theme is a dominating concern, among participating teachers, for the content or factual material of "their" respective subject areas. Often, when planning an environmental education program, a multidisciplinary perspective dominates -- that is, the program is seen as an opportunity for presenting content material from a number of disciplines in some form of mix related to a theme.

Characteristically, a debate develops based on disciplinary parochialism, with participants attempting to ensure an adequate coverage of aspects of "their" subject area's content. The criterion for inclusion of material in the program is whether justice is being done to the various subject areas involved. The result is often characterised by a lack of agreement and cooperation by some subject area representatives, and an ill-fitting jig-saw of content material.

An issues-investigation approach such as that referred to earlier is based on an alternative view of what is valuable subject-related material. In this approach, the emphasis was on the provision of opportunities for students to exercise investigative or inquiry skills from whatever source (including the "traditional" discipline-based subject areas) in the investigation of a local, current environmental issue of interest to them. Here, the criterion for inclusion of activities and experiences into the developing program is whether justice is being done to the issue investigation. Subject area parochialism has no place in this approach. The directive influence over the nature of the program is the issue investigation, not some previously-held convictions about the worth of subject area content.

However, subject areas are not being neglected. Inquiry skills are being exercised (this, after all, is the medium of the issue investigation -- it is a process approach). Furthermore, inquiry skills cannot be exercised in the absence of content; students are generating information and developing awarenesses. Their substantive repertoire is being expanded. The difference is that the subject areas are regarded as tools -- as sources of skills -- to be applied in the investigation of the issue.

Depending on one's commitment to the substantive or content aspects of subject areas, one can adopt an issues-investigation approach to environmental education

in a number of ways. Two models discussed in the INE study are outlined below.

1 The Compromise Model

The program consists of two phases (i) issues-investigation and (ii) disciplinary resources. The latter (disciplinary resources) phase is a systematic treatment of the subject matter (both content and inquiry skills) of the teacher's discipline-based subject area. At regular intervals in the program, the teacher and students drop out of the "disciplinary resources" phase and lock into an issues investigation -- preferably one that arises "naturally" in the nearby environment of the school.

In phase (i), the intent is to develop interdisciplinary "issue-investigation" skills such as those referred to in the overall aims of the "Investigating the National Estate" kit. In phase (ii), students are brought into contact with subject-based content and provided with opportunities to develop disciplinary inquiry skills -- content and skills which may be drawn upon in the issue-investigations of phase (i). In this "Compromise Model", the balance between phase (i) and phase (ii) is critical.

This model is based on two assumptions of Fensham and May's(50) model of environmental education as an aim of core curriculum: (i) each subject area has a

contribution to make to environmental education; (ii) not every aspect of subject area content is relevant to environmental education (and yet ought to be present in the curriculum).

2 The Serial Issues Model

Here the program consists solely of a series of issue-investigations. Students are provided with multiple opportunities to achieve aims (such as those of INE) associated with environmental decision-making. The prime emphasis is on "education for the environment" -- development of students' ability to be effective agents in influencing the resolution of environmental issues. It is important to recognise that once again this model does not imply the abandoning of the subject teacher's disciplinary interests. The investigator of any issue requires the application of disciplinary inquiry skills, and results in the development of certain disciplinary awarenesses. The teacher has the opportunity within an issue-investigation context to emphasise those skills and awarenesses which are believed to be important from a disciplinary point of view. For example, Grovedale Technical High School's "woolstores" issue-investigation emphasised social and aesthetic considerations to a greater extent than, say, natural science considerations. So in this "Serial Issues" model, the selection of issue for investigating is important from a subject-area perspective: over an extended period, a range of issue investigations would allow opportunities

for the exercising of a range of inquiry skills and development of a range of unde^rstanding of facts, concepts and theories.

(b) About the Methodology of the Study

The intention here is to firstly reflect on the INE experience (the seven features of the cluster-based action research model identified by Kemmis(51) will be used as a "checklist" in this analysis), and then to identify a number of methodological issues to emerge from the experience.

Discussion in cluster meetings centred around issues of common concern to participants. Issues were initially identified during a free-ranging discussion in the second meeting, and opportunities were provided at each subsequent meeting to broach new issues and to confirm or disconfirm interest in the initially-identified issues. The approach was simply to invite individuals to identify problems about the kit -- either verbally or submitted in written form. A typed pro forma version of the list of initially-identified issues was distributed for comments at each monthly meeting and the feedback obtained permitted the monitoring of changes in perceptions of implementation issues.

The assumption that the responsibility for curriculum change lies in the schools was adopted. In accordance with this assumption, the level or type of use of the materials

was left to the discretion of participants and schools. Suggestions for changes in practice ("solutions" to problems/issues) emanated from cluster group discussion and were applied by participants to an extent governed by the constraints of their setting.

The cluster-meeting process was involving for participants in that there was general engagement in planning, implementing, observing and reflecting -- participants were involved in an action research attack on issues of common interest. However, the transfer of ownership of the method of attack to individuals was incomplete: the pattern was for participants to present largely descriptive reports on their practice at meetings (this was evidence of implementation and observation between meetings) and for analysis and reflection to occur, in the main, in the context of the group meetings. Not all individuals engaged in serious reflection between meetings. Multiple representation from the respective schools did not seem to foster co-operative reflection within the schools.

The cluster meetings did provide a support structure across schools. For example, a teacher at one school has shared his experiences in the Secondary History Education Project with the history faculty of another school; this contact was initiated at cluster meetings and pursued on several occasions independently of cluster meeting activities. However the other methodological advantage of multiple school involvement (setting the conditions for

the development of common languages for describing the problems and issues at hand) was not realised. This was a key shortcoming of the study as it affected the efficacy of analysis of issues. At each meeting, different issues and descriptive reports were analysed, but the criteria of analysis also shifted from meeting to meeting, depending on such factors as composition of respective cluster meetings, and personal commitment of participants to substantive issues. Hence any understandings, or theoretical conceptions of the innovation, tended to develop in a rather disorganised fashion.

As participants' implementation of the materials proceeded, instances of the personality-dependence and politics of innovation emerged. In one school a Unit of the INE kit was rejected by a faculty on the grounds that the kit did not fit in with the faculty policy of basing their programs on "hard factual content" -- a degree of resistance was brought to bear on the teacher using the kit. In another case, teachers avoided using Unit 1 case study material, and an approach was based on the investigation of local environmental issues, because of a perceived (and in the past demonstrated) dislike of "anything political" on the part of the school principal. These instances provided "grist for the mill" for a discussion on characteristics of educational change.

The cluster-based action research model is said to "create links for participating teachers and schools with a group of involved university staff who work as

facilitators of the action research and development process"(52). There were instances of co-operative work (for example, co-authored reports) and technical and planning assistance. These links have been maintained in the cases of six participants, who have elected to continue their involvement in a second cluster-based action research study.

A number of methodological issues emerged during the course of the study. Firstly, the study showed that a cluster-based action research group can assist in self-development by functioning as a co-operative unit in the following ways:

- (i) extending the range and depth of analytic thinking about the topic;
- (ii) generating mutually useful information -- the making public of a diversity of experiences enhances the possibility of cross-fertilisation of ideas;
- (iii) organising and sharing resource support (links were established with a number of community groups);
- (iv) negotiating with developers. (Where teachers are implementing a curriculum package, a cohesive group of implementers possess more "clout" than individuals in establishing communication channels with developers of the package);
- (v) fulfilling a dissemination function: understandings about the innovation can be communicated with other teachers. (Members of the Geelong cluster group, in response to a request from the convenor of the 1981 Victorian conference in environmental education, took a

leading role in some of the workshop sessions at the conference);

(vi) attracting funding support (a recent Victorian RISEC circular invites groups of teachers working on specific educational issues to apply for monetary grants to support their work).

Secondly, in the context of this application of the model, a number of barriers to teacher development were identified. Certainly, the cluster group operation succeeded in the generating and sharing of a number of strategies originating from within the context of existing teaching practice. These together with methodological understandings about the co-operative functions of a cluster group are, perhaps, a form of teacher development. However, the development process ought to aim for more explicit examination of the assumptions underlying teaching practice . It is to this latter aspect of teacher development that the following points emerge as barriers:

(i) A continuing distraction by immediate practical problems.

When working on a topic like "exploring the potential of a kit of curriculum materials", it is natural to envisage the object of the study as the concrete, discrete kit itself -- to concentrate on the materials themselves rather than on the relationship, say, between the potential of the kit and established teaching practice, or between the activities in the kit and the different kind of learning to be expected. As a

consequence, early discussions centred on immediate practical concerns like readability or the materials, and the quality of illustrations.

Alternative courses of action suggested by participants to deal with these problems tended to require only small-scale adjustments with little challenging of existing teaching practice or school organisation.

A number of these problems were identified in the first two meetings of the cluster group. A consideration of such problems seemed to be an appropriate starting point in a study of this type, given the interests of the sponsors, at least. The decision to be taken at that point was whether to attempt to deal with these issues fairly quickly -- say, at the next meeting -- or to address them in a more thorough and systematic fashion over a number of meetings. The second course of action, which seemed to have the advantage of enabling reflection on the issues to be based on a more prolonged period of classroom usage of the materials, was adopted. An outcome of this decision was that a significant portion of the cluster time available in later meetings was taken up with a consideration of issues identified in the first two meetings. It is possible that working through these "non-threatening" practical issues created a basis for more penetrating analysis of the more threatening issues of classroom practice and curriculum. It may be argued, however, this sustained orientation towards problems which were immediate, practical and for

which solutions existed in the pool of existing teaching strategies (the combined experiences of cluster group members) acted to divert attention away from more complex, fundamental and pervasive problems -- problems which may have directed our analysis into a search for the assumptions underlying existing practice, with perhaps more positive outcomes of teaching and school improvement.

(ii) Disciplinary chauvinism.

The structure of the kit of materials invited, and served, the interests of teachers from a number of different disciplinary areas. While a preoccupation with disciplinary interest is obviously a major philosophical problem in establishing interdisciplinary programs or approaches like environmental education, disciplinary chauvinism also poses methodological problems for cluster-based action research. The cluster comprised participants with differing disciplinary backgrounds, and the kit was perceived by participants as possessing material of value to disciplinary programs. A product of these two factors was a tendency for participants to "tune in" and "tune out" of discussions as specific discipline-relatedness waxed and waned. Participants were able to justify their participation in terms related more to the furtherance of disciplinary aims than to the development of an understanding of the interdisciplinary nature of the kit. Thus, participants' needs were being fulfilled to an extent, but these needs were as disparate as the disciplinary background of

participants, and their fulfillment tended not to involve a co-operative critical inspection of teaching assumptions.

(iii) Size of the cluster.

In cluster-based^e action research, it seems more important to restrict the size of the cluster to a small number of committed participants than to attempt to maintain a large group in the interest of variety of teaching background. With a large group, it is not difficult to become so absorbed in the process of group management (for example, providing every participant with an equal opportunity to be heard; attending to multiple interests) that opportunities to pick up important fundamental issues are missed.

This last statement implies that in the absence of a directive influence from the research-facilitator discussions will remain at the practical, concrete, "current practice" level referred to earlier. This is probable to the extent that membership of the cluster group is inflated with participants uncommitted to action research methodology and/or the need to grapple with more fundamental issues; that is, the pressuring of participation is dysfunctional and membership of the cluster group should be left open.

(iv) The lack of an explicitly-formulated "common language".

It was mentioned earlier that the transfer of ownership

of the method of attack to individual participants was incomplete. This contributed to a lack of commitment to reflection between meetings. In addition, at each meeting as different issues and descriptive reports were analysed the criteria of analysis also tended to shift, depending on such factors as composition of cluster meetings, and personal commitment of participants to issues under analysis.

In retrospect, it is clear that the need existed for an explicitly-formulated "common language" which could serve the two functions of enabling the field of action to become more explicitly characterised for all participants, and providing some stability to the dialogue of cluster meetings. A framework was required which could be used as a tool by participants in self-reflection independent of cluster group discussions. Action research is based on the democratic principle of investigating issues of mutual interest and concern to participants: the facilitator's interest should not dominate the interests of other participants. If teacher development is to be associated with action research, then the facilitator needs to ensure the progression of cluster group activities towards the broaching of fundamental issues requiring an inspection of the assumptions underlying teaching practice. By stabilising dialogue and assisting with the cumulative analysis of issues, an explicitly-formulated "common language" may facilitate this progression.

4.4 The Environmental Education Project

Introduction

In 1981, the Curriculum Development Centre completed its Environmental Education Project (EEP) with the release of a curriculum resource kit of four publications in environmental education(53). The author's involvement began in late 1979, and his study of the EEP was able to embrace the operations of the project team as well as the materials and their dissemination and implementation.

As stated earlier (section 4.2), the origins of the EEP lie in some four years of extensive deliberation and negotiation at C.D.C. about environmental education and about an appropriate curriculum model for dealing with environmental education. The model adopted in respect of the EEP was one which sought to preserve a coordinating role for the central agency, while the materials development phase was to involve cooperative interaction with practising teachers.

The intention in the EEP was to tap instances of "tried-and-true" environmental education programs in operation in the schools, to edit, package and publish centrally the resultant manuscripts, and to disseminate the published accounts back among the schools. The process of tapping environmental education in schools was facilitated by the implementation of an incentive scheme of small scale grants (up to \$500) administered from

C.D.C's Environmental Education Project funds. In response to advertising, individuals with environmental education interests applied for a grant to enable them to prepare a manuscript describing their involvement. One criterion for the allocation of grants was the extent to which the prospective grantee's description of activities contributed to C.D.C's view of environmental education -- a view which had developed during an incubation period of four or five years before the official commencement of the Project. In addition to the manuscripts emanating from the small scale grants scheme, some manuscripts were commissioned. The resulting descriptions and analyses of activities "passed through a range of trialling, vetting and editing services which involves teachers, the (Project's) Advisory Committee, the State Liaison Officer network and the management procedures convened by the Centre"(54).

The "State Liaison Officer network" was a significant component in the Project's operations: the Project team included a representative with the title "State Liaison Officer" from each State and Territory who acted as intermediary between the authors and the Project Director. Since the Centre wished to adopt a relatively low profile in the development and dissemination of the materials, responsibilities in dissemination, in particular, were to be devolved to the State level. It was intended that the State Liaison Officers would be able to employ their own consultancy and resources support networks for dissemination purposes. Thus, the Environmental Education

Project also provides an example of an attempt to disseminate information via a medium-level network (that is, one made up of educational consultants within the respective states) built around existing linkage agents and institutions.

The methodology of the study of the EEP was eclectic, including the following elements:

- * participant observation of meetings of the Project team during 1979 and 1980;
- * analysis of Project documents, and of the EEP materials themselves;
- * analysis and mapping of sales data for each State of Australia;
- * questionnaire survey of all purchasers of the materials;
- * telephone interviewing of users of the materials;
- * personal interviews with members of the Project team.

The final report of the study was presented to the Curriculum Development Centre in May 1983(55). This report had four sections: Project Operations -- the background to and workings of the "Environmental Education Project"; the Materials themselves as concrete outcomes of the project operations; Dissemination and Implementation -- the way the materials were distributed by project personnel and put to classroom use by teachers; and Reflections - a more speculative, wider-angled perspective on the understandings that the project has to offer the field of educational innovation.

This account of the EEP Evaluation Report will present versions of the first three of these four sections.

Project Operations

A key role was envisaged for the Project Team in the C.D.C's intended decentralised, cooperative mode of operation. The Team was seen as a network of regional environmental education consultants capable of providing a focal point for the flow of information between the Centre and the "periphery" (teachers, teacher groups, and community groups). It is important to note, however, that despite the fact that a central "perception of environmental education" had been evolving from the earliest days of Curriculum Development Centre operations, the Centre's last report developed immediately prior to the consolidation of the Project Team did not explicate a perspective on environmental education in the form of a definition or statement of aims. The Project Team, then, inherited a difficult brief.

Project operations commenced in 1978, and by the end of 1979, after several meetings of Project personnel, a critical stage was reached. Funded time for the Project was running out, several manuscripts from teacher-authors were in hand, and the decision-making activities -- what to include in the packaged Project materials -- were at their most intense. In an internal self-evaluation of Project operations by Project participants, a number of

issues were raised.

(a) The fundamental assumption that "good environmental education materials and programs exist 'trialled and tested' in the schools".

Clearly, the model adopted by Project personnel assumes that (firstly) there are plentiful examples of environmental education currently in schools and (secondly) that at least some of these examples will cohere with the centre's view of environmental education. In the light of the number and nature of manuscripts forthcoming as a result of the Project's small scale grants scheme, the validity of this assumption was questioned by several members of the Project Team.

(b) State Liaison Officer "time release".

A number of State Liaison Officers spoke of the impracticability of their supposed one-fifth time release entitlement. While the original proposal was that each SLO have approximately one-fifth time to coordinate the activities of the small-scale grant recipients, it transpired that in most cases there was no release from a similar fraction of systemic demands, and Project duties were simply superimposed on normal (systemic) duties. Most State Liaison Officers confessed to placing their normal demands higher on their priority list than Project demands, to the extent of encroaching into the supposed one-day per week "project time". In addition, it was felt that one-fifth time release was insufficient for Project demands, even if it had been

possible to devote the entire one day in five to Project concerns.

(c) The inbuilt tension of the Project's guiding model.

The desire on the part of the Centre for first hand reports by teachers was for the reason that other teachers would relate readily to such reports. However, it was generally agreed by participants that teachers have difficulty in committing their ideas to paper for other teachers. State Liaison Officers also felt uneasy in dealing with the variety of literary styles, and believed that this variety, and the quality of at least some teachers' original manuscripts, were not aligned with the Centre's publication requirements. The model was perceived as having inbuilt tensions derived from the desire to have first hand reports by teachers in the field and the Centre's desire for a quality product within its accepted standards.

(d) The role of the Project Director.

Project Team members felt that the job-role of the Director was insufficiently defined -- in particular in respect of rights in decision-making. The problematic nature of the Director's role would seem to be an expression of the tension between the Centre's twin interests in coordination and cooperation.

(e) The "conceptual framework".

The "conceptual framework", a commissioned manuscript, was cited as a matter of concern by most

participants. It was one of the last papers to be received and finalised before Project operations ceased. In the view of the Project Coordinator, it was the most troublesome paper of all the manuscripts. It was agreed that many teachers and school administrators (potential contributors to the Project) were unsure about what "environmental education" meant in the context of the advertisement and therefore were reluctant to apply: the unavailability of a conceptual framework meant that no criteria could be provided to authors about the Project's view of environmental education and further that "no common basis was established on which the (manuscript) author, the State Liaison Officer and the Project Director could discuss the environmental education content of the manuscript".

The issue of the conceptual framework is a key one -- in both a process and product sense. The conceptual framework embodies what is taken as the Project's theoretical perspective on environmental education. As indicated in the State Liaison Officers' comments, it could have provided a useful reference schema for all participants in the processes of the Project. It also takes a key position in the "Planning" chapter of the final draft of the materials themselves.

The "conceptual framework" was one of the first commissioned papers: it was not generated by the SLO group itself. The Project Director stated that, after it became clear at an early (1978) Project meeting that a mutually

acceptable definition of environmental education was not going to emerge easily, it was decided to commission two individuals from outside the Project to write the paper.

The option of commissioning an "imported" conceptual framework was preferred to both of two other options. Project personnel elected not to fashion a negotiable, mutually-agreed conceptual framework based on the meetings and understandings of the practitioners -- the individuals whose work was to be "written up" in manuscript form. This option would, of course, require close contact with classroom teachers, sympathetic dialogue about their work, and the identification of interpretive meanings -- meanings interpreted from the ways in which terms are used in unselfconscious description of actions to which the terms refer, contextual discussions about problems encountered, and so on. This approach has the potential of establishing a language and conceptual framework that is consonant with practice (the practice being tapped by the small scale grants scheme). By not adopting this approach, conditions were created from the outset for a disjunction between the rhetoric of the conceptual framework and the reality of the practice that the Project was seeking to describe.

The Project Team also elected not to adopt the approach (though the Director's comment above suggests this might have been the original intention) of negotiating their own set of stipulative meanings -- that is, a language and conceptual framework generated by a process of overt

negotiation of meanings in discussions about the meanings of the terms and their use. In Project meetings, participants were not required by the chairman to commit their views about environmental education to paper for group criticism and negotiation. The group did not follow the Popperian notion of improvement through community critique of participants' work; consequently a language with shared meanings among all participants did not develop. A statement generated and understood by the Project Team, and thought to be a "good" or "improved" conception (in their own terms) did not emerge.

The absence of a such a statement (or framework of shared understandings) had important implications for Project operations. The lack of the negotiation process required for such a statement permitted the persistence of the diversity of initial, independent views held by individual participants, and the non-resolution of some important substantive issues. The absence of a negotiated conceptual framework meant that there was no single organising principle either for prospective grantees to employ in making judgements about the relationship between their own theory and work and the "theory" of the innovation, or for the State Liaison Officers to invoke in the manuscript-vetting part of their operations. Also, the evaluation of the small grant applications, negotiations with prospective grantees over manuscripts, and selection of manuscripts for publication continued to be conducted with SLO's making judgements against a background of unresolved differences in concepts of environmental

education. The operations of the Project were, therefore, unable to ensure that selected manuscripts described programs which represented concrete examples of the ideas of the conceptual framework.

Summary

The Project Team faced fundamental difficulties in attempting to operationalise the model they inherited. They chose not to negotiate a conceptual framework with practising teachers such that coherence existed between framework and practical examples; this created the conditions for a rhetoric/reality gap from the outset. They opted for a materials structure comprising conceptual framework plus case studies and suggested activities supposedly illustrating those concepts; this created the conditions for the rhetoric/reality gap to be made concrete in the form of the materials themselves. They were unable, for reasons to do with the group dynamics of meetings, to produce "their own" conceptual framework (instead they commissioned this vital document). This inability, and the lateness of the imported conceptual framework, resulted in ongoing differences among the group about "what environmental education is", and a lack of a reference point for prospective manuscript authors. The small scale grant scheme did not unearth any examples of environmental education that met with the "expectations and priorities of the Project"; this created real problems of internal consistency within the Project materials.

The Materials

The EEP materials comprise four publications. In addition to its substantive content of suggested practical activities and case studies of environmental education in practice, each publication includes information about the Project and about the Project's view of environmental education. However the materials are not isomorphic. They differ in the type of environmental education activities they offer, and in the extent to which they present an account of the Project's view of environmental education. Only the Primary Sourcebook actually presents the Project's "conceptual framework" made up of statements of dimensions, aims, guiding principles, and suggested approaches to environmental education.

A pattern which emerges from an analysis of the Project's "rhetoric of environmental education" is that although the Project distinguishes between four dimensions of environmental education (education in the environment; education from the environment; education about the environment; education for the environment)(56), more fundamentally there are only two levels.

One is a technical level, represented by education in, about and from the environment. The focus in each of these dimensions is on greater understanding of the environment per se -- greater understanding of its biotic and abiotic components, their interrelationships, and the skills required for investigating these components and

interrelationships. Among the in, about, and from dimensions, only the techniques differ: classes of children may engage in their usual studies out-of-doors (or in the environment) or may do so using aspects of the environment brought into the classroom (from the environment) in some passive way, as a result of direct experience, or they may elect to structure a program of information about the environment. The main environmental education-related justification of education in, about, and from the environment is enhanced understanding of the environment: the assumption is that "a certain amount" of knowledge is necessary before a student can sensibly participate in action (in the form of investigating environmental issues). This level is technical in the sense that it is based on a view of knowledge that suggests that knowledge or facts are in principle separable from action and human values; it also leaves unquestioned the existing practices and structures of the institution of schooling. The technical level of environmental education -- education in, from or about the environment, with their shared ultimate intention to improve students' understanding of substantive aspects of their environment -- is strongly compatible with the existing features of institutional education. An emphasis on factual content is taken as legitimating a teacher-directed teaching style, where the teacher acts as an authority-in-knowledge and where decisions about what is learnt are taken by the teacher on behalf of the students. And the existing disciplinary structure, expressed as strong subject boundaries, is

legitimated by definitions of education in and from the environment which are couched in disciplinary terms, and by technical interpretations of environmental education as education about the environment which loosely equate it with natural science and geography. At the technical level of environmental education, the endeavour is subordinated to serving disciplinary ends: the chief organising principles are the objectives of existing disciplinary-based subject areas.

The second level, represented by education for the environment, is political. The focus at this level is not directly on the environment per se, but on environmental issues. The intention is enhanced understanding of the processes of environmental problem-solving -- the means by which the environment is exploited, the manner in which decisions about the future of aspects of the environment are taken, the interests being served by certain decisions, and the means by which those decisions may be influenced. Environmental issues are seen as educational vehicles for the exercising of problem-solving skills (critical thinking and decision-making skills). Improved understanding about environmental problems and their resolution is the main intent, but improved understanding about the environment takes place because of the direct contact with those aspects of the environment relevant to the problem or issue under investigation. At the "political" level, environmental education is based on the view that the exclusive provision of knowledge about the environment is inappropriate; that the exclusive provision

of opportunities for exercising investigation skills is inappropriate; and that what is required is action, in which knowledge and skills are developed in the course of investigating, forming an individual opinion about, and formulating and executing an action plan in respect of, an environmental issue. The central notion is a dialectic between knowledge and action; the environmental issue is the context or arena for the debate and dialogue which mediate that dialectic. This level is "political" because it is predicated on the belief that understanding is linked to active participation, and it challenges the existing practices and structures of the institution of schooling.

The "political", education for the environment, level of environmental education as implied by the Centre's rhetoric in the Primary Sourcebook, suggests a form of organisation which is not compatible with, and in a sense represents a challenge to, the general features of institutional education. The implied student-teacher relationship in education for the environment is not that of the conventional, didactic, teacher-directed pattern. Since students are placed in contexts (those of environmental problem-solving) where they, as individuals and groups, are required to choose between alternative courses of action on the basis of their own developed environmental ethic, the emphasis is on encouraging the autonomy of individuals and groups -- a feature associated with non-directive teaching. Further, since the context which provides the opportunities for decision-making is

the environmental issue under consideration, the chief organising principle is the issue itself: the objectives of environmental education are supra-disciplinary.

Analysis of the four publications of the EEP suggests that their relationship to the Project's rhetoric of environmental education is variable.

Walmit Divided

There is no environment-related content (that is, information about the environment in the form of facts, concepts and theories) in the Walmit Divided package. Nor is there a series of activities aimed at providing opportunities for exercising skills for investigating the environment.

Walmit Divided comprises a set of scenarios, each of which depicts a hypothetical environmental issue in a hypothetical rural town ("Walmit"), and a set of profiles, which provide background information about the lives of "Walmit" residents and participants in the issues. The issues depicted range from urban to wildlife-related; the profiles include developers, decision-makers, residents and conservationists.

In brief, Walmit Divided is designed to support a simulation experience in which students adopt the roles of characters who are participants in the deliberation about and resolution of a controversial environmental issue. The

stated aims and objectives of Walmit Divided, hidden away in a low-profile, self-effacing "Non-guide", are:

Aims:

- (1) To enable pupils to appreciate any change in the environment will affect different people in different ways and evoke different responses;
- (2) To foster the development of empathy and an awareness of human irrationality;
- (3) To develop knowledge of the responsibilities and obligations of citizens of a democratic state.

Objectives:

- (1) The understanding of the dynamics inherent in the decision-making processes;
- (2) The acquisition of the study and research skills that are the prerequisites of effective argument;
- (3) The motivation of pupils towards cooperative stances.

The whole purpose of the package is to provide representative environmental issues (in the form of scenarios) which can act as supra-disciplinary organising principles. While the activities conducted may be interpreted as bearing some relationship to existing disciplinary programs, they are not designed to serve disciplinary ends. The activities are designed to inform students in the dynamics -- the political machinations -- of decision-making processes in respect of environmental issues.

The absence of activities for developing knowledge about the environment and skills for investigating the environment, together with stated aims and objectives which relate to decision-making in contentious environmental matters reveal Walmit Divided to be closely aligned with the "education for the environment"

dimensions of environmental education.

Streets

The activities of Streets appear to have been designed to fit in with conventional courses in social studies. The introductory statement that "this booklet illustrates how observation and communication, using a local street, can constitute a starting point in environmental education" suggests that the activities are primarily concerned with exercising such process skills as observation, comparison, analysis and communication. The settings of the activities suggest the development of understandings about the urban environment -- for example, aspects of architectural design.

The booklet contains a number of activities which are but minor variations on a general theme of "investigating the local urban environment". The substantive (knowledge-related) aims appear to be aligned with "education about the environment"; the process aims are explicitly to do with investigation of the environment (that is, education in the environment).

Exploring Outdoors

The body of Exploring Outdoors is divided into two parts -- "Teachers' Notes" and "Student Work Card Activities". The emphasis is similar to that in Streets, with the booklet providing "opportunities for learning by

doing which involve children in observing, collecting, categorising and evaluating ... in a study of the outdoor environment". The "Useful References" note reveals a definite disciplinary (science) orientation on the part of the authors of the book. There is no apparent intention in this publication to examine environmental issues, to develop critical thinking, and to exercise decision-making skills. Thus, as with Streets (though in a non-urban setting), the substantive emphasis is on the acquisition of knowledge about the environment through the exercising of process skills in the environment.

Primary Sourcebook (57)

The Primary Sourcebook is the key publication of the four in the E.E.P. series. Not only is it larger than the other three, with a title that connotes its primacy, but it includes a development of the Centre's view of environmental education in its extensive theoretical readings. The Primary Sourcebook is a "mixed bag", including in addition to the theoretical chapters ("Introduction to Environmental Education" and "Environmental Education: A Conceptual Framework"), a set of case studies in curriculum development and assorted descriptive and prescriptive chapters about school and schoolground design, films, festivals and curriculum packages. The contents are far more heterogeneous than those of Walmit Divided, Streets, and Exploring Outdoors.

The theoretical chapters are written by the CDC Project Coordinator, an academic and a federal public servant. The more practical prescriptive and descriptive accounts are eclectic, in the sense of emanating from a number of different authors (some of whom are teachers) and settings. This eclecticism reflects the small scale grant mechanism underlying the materials' development. These chapters also show a variable relationship to the respective dimensions of environmental education outlined in the rhetoric of the earlier chapters, with a greater alignment with "education about and in the environment" than on "education for the environment".

Nearly every chapter in the book describes instances of environmental education which contributes to the "education about the environment" dimension, in the sense of directly or indirectly developing explicit knowledge or implicit awareness about the environment. An example of a chapter which seems to be primarily concerned with "education about the environment" is "Environmental Science, K-2". This is a well-illustrated account of a "program aimed at developing basic ecological concepts through the children's own sensory experience out-of-doors". The program comprises a number of "ministeps" which in fact comprise a sequence of environmental facts on which lessons are to be based. A number of sample "experiences" are provided, each of which outlines an activity, suggests which aspects of the activity the teacher should extend and reinforce, and indicates the disciplinary concepts which the activity is

aimed at developing.

The presentation of content of this type in the name of environmental education (an action of the Project team, though not of the author of the Chapter) raises two issues. Firstly, the selection and provision of substantive content drawn from pre-existing subject areas implies a degree of teacher-direction of the learning experience: the determination that the content is necessary is one made by the teacher; understandings are structured by the teacher rather than emanating from the action of an issues investigation (as in education for the environment). The implicit message is that this information is required prior knowledge. Secondly, the fact that much of this content is drawn from the area of natural science imparts a disciplinarity to the enterprise: the material is selected on the basis of its contribution to disciplinary (rather than interdisciplinary) objectives. This tends to reinforce the common interpretation of a natural science/environmental education equation -- a technical interpretation.

The education in the environment dimension and education from the environment dimension are also well represented in the Primary Sourcebook, with papers such as those entitled "An Urban Field Centre" and "Activities Using Animals in the Curriculum Areas". The education for the environment dimension is the least well represented dimension in the Primary Sourcebook. Two chapters which attempt to exercise environmental decisionmaking skills are

"Developing Schoolgrounds for Environmental Education" and "Drama in the Environment". The former provides background information for developing school grounds as an environmental resource, together with a series of "major planning steps" -- one of which encourages the involvement of students in the taking of decisions about "which ideas, and whose ideas, should be given priority" in determining the plan for a revised schoolground layout. "Drama in the Environment" involves students in the playing of roles associated with the analysis of and deliberation about a simulated environmental issue, in the manner of Walmit Divided.

The Primary Sourcebook succeeds, then, in providing practical examples of environmental education associated with each of the four dimensions of environmental education outlined in its early theoretical chapters, though the emphasis seems to lie on the technical level of environmental education (the in, about, and from dimensions)

Summary

The series of four Environmental Education Project publications comprise an eclectic collection of practical materials alongside a single preferred theoretical perspective. From the Centre's point of view, the materials as a whole do not manifest the priorities of their expressed single preferred perspective on environmental education. From an outsider's or

field-worker's point of view, the materials are equally partially relevant and consistent(58).

Specifically, in the Project's rhetoric of environmental education, there is a prescription for a dialectic between knowledge and action -- a dialectic mediated by a process of investigating environmental issues. Much of the materials, however, imply a disjunction between knowledge and action -- a technical approach in which it is implied that a certain amount of knowledge is needed prior to embarking on action (where "action" is the process of exercising problem-solving, decision-making and critical thinking skills in the context of an issue investigation, in order to develop an understanding of the "political" character of environmental issue resolution).

The four publications are separately available: this means that Streets and Exploring Outdoors, both of which are clearly supportive of environmental education at the technical level, may be obtained and utilised in the name of environmental education without the teacher-user even coming into contact with the Project's rhetoric. While the teachers who use the materials in good faith are innocent parties in this situation, the materials themselves may, despite their rhetoric, be actually legitimating a technical interpretation of environmental education.

Dissemination and Implementation

The four publications of the Environmental Education Project became available in January 1981, and since then have found their way into significant numbers of schools across the country and overseas. An assumption in this section is that the ultimate measure of the effectiveness of dissemination strategies invoked in respect of the materials is the manner in which the materials are used at the school level. Dissemination strategies and implementation patterns will also be related to the "rhetoric of environmental education" espoused by the Project.

As a consequence of the Curriculum Development Centre's intention to devolve responsibilities in dissemination of the materials to the States, the Project team's State Liaison Officers drawn from each State education system became key figures in the dissemination of the materials. This section will reflect on the effectiveness of invoking existing systems and networks in the dissemination of innovation.

Comments in this section are based on analysis and mapping of sales data supplied in April 1982 by the Curriculum Development Centre (C.D.C.), a questionnaire survey, telephone interviewing, participant observation of project team meetings, and document analysis.

(a) Standard C.D.C. Dissemination Strategies

The dissemination strategies adopted in relation to the Environmental Education Project materials can be divided into two categories -- "standard" C.D.C. strategies employed for projects other than the E.E.P.; and E.E.P.-specific strategies.

The "standard" C.D.C. dissemination strategies adopted for their environmental education materials included the following:

- * One-page "flyers" (promotion leaflets) posted to all schools on two or three occasions;
- * national and state launchings: these take the form of an advertised gathering of teachers and interested others at a central venue at which the developers (C.D.C. personnel) speak about the materials' development, structure and content. The materials are on display for perusal;
- * review copies: these are sent free of charge to various subject associations, the Australian Conservation Foundation, and the Gould League;
- * conference segments: the materials featured prominently in both displays and presented papers at the 1980 and 1982 national conferences of the Australian Association for Environmental Education, the 1981 and 1982 Victorian inservice conferences at Lorne, and the 1981 New South Wales Association for Environmental Education Conference.
- * advertisement: the materials were advertised in subject association newsletters;
- * roving display: a portable display of the materials was erected at a number of conferences, inservices, and locations of high visibility.

These strategies, while used as part of the dissemination approach for the E.E.P. materials, were not designed specifically for those materials. Their main

intent seems to be to raise the visibility of the materials, to enhance teachers' awareness of the existence of the materials, and to promote sales. The extent to which these strategies encourage or even permit dialogue between developers and implementers about implementation is extremely limited.

(b) Attempts to Design E.E.P.-specific Strategies.

It was the intention at a meeting of State Liaison Officers (SLOs) in Adelaide (October 1980) to develop a set of dissemination strategies designed with the particular characteristics of the E.E.P. materials in mind. The approach in this meeting was for each SLO to take responsibility for reading a component of the materials, and to present to the rest of the Project team a "potted summary" of the component together with a perspective on suitable dissemination strategies for that component.

A number of assumptions underlie this approach. Firstly, there is the assumption that the SLOs and their consultancy networks are effective disseminators (this premise was in fact verbalised by the Project Coordinator at the beginning of the meeting). Secondly, there is the view that "inservicers can inservice other inservicers" -- that an individual, on the basis of an armchair evaluation of curriculum materials, can inform another individual about practical implementation issues through a purely verbal process, without recourse to classroom experience

with the materials.

The impression gained from the meeting was that individual SLOs would be disseminating the materials in their accustomed fashion; that is, that there would be little tailoring of SLO-controlled dissemination strategies on the basis of perceived particular characteristics of the materials themselves. Some of the comments passed at the meeting are relevant at this point:

My role will be to supply the materials to the teachers and then hope that things go on from there...

I will be satisfied with any attempt to increase the amount of "education in the environment".

I intend to use existing science inservices to push the E.E.P. materials.

My role is to simply pass the materials on to teachers.

My present thinking is that our dissemination strategies will include

- (i) inservice broadsheets;
- (ii) inservicing of resource personnel;
- (iii) regional seminars.

When introducing principals to the E.E.P. materials, I will be presenting them with my own view of environmental education as well as the conceptual framework.

I will be using my support staff in the same way as I have with other environmental materials.

How are we going to get teachers involved in talking about the materials?

Selling is only one aspect of the issue of dissemination -- what about getting the ideas of the kit into classroom practice? There are massive changes in teaching behaviours required.

When the grants scheme was adopted, the dissemination and implementation considerations should have been thought through and planned for, rather than just now at the production stage.

Walmit Divided is a means of leading students into environmental decision-making and action planning. A Walmit workshop may be an effective dissemination strategy.

These limited samples of the dialogue reveal two differing orientations on dissemination. On the one hand, there is an orientation whose main concern is with the bureaucracy of dissemination. Proponents of this orientation display attitudes of "knowing about" dissemination to the extent of deprecating others' attempts at broaching new issues -- an "I don't like being shown how to suck eggs" attitude. Proponents of this bureaucratic orientation display a prime concern with the mechanics of informing teachers of the existence of the materials, and with the means of enhancing sales figures. Little interest is expressed in the difficulties teachers will face in implementing the materials; interest is expressed in the functioning of networks. Intentions are expressed to employ existing networks in conventional ways.

There were signs of a less vigorous orientation at the same meeting. Some individuals were adopting a teacher or classroom orientation; their concern was with the issues and problems likely to arise when teachers attempt to achieve the "higher-order" environmental education objectives to do with "practice in decision making", "environmental action" and "values clarification". One SLO was particularly concerned with the relationship between the innovation and inquiry teaching; another, when referring to Walmit Divided, suggested that workshop

sessions with teachers using Walmit Divided might be a "means of getting into controversial issues and values-clarification in a non-threatening way". This latter liaison officer pointed to the opportunities with Walmit for practising alternative teaching strategies and leading children into decision-making situations, and suggested that classroom practice with the materials might be a means of identifying implementation problems. The characteristics of this orientation are flexibility, a sympathy with the materials-in-context, and face-to-face interactions with teachers.

The two orientations to dissemination may be a function of the normal professional roles played out by the individuals advancing them. Of three Project team members who at times revealed an orientation to issues concerning classroom usage of the materials, two were themselves either classroom teachers or working in close collaboration with teachers on a long-term teacher-as-researchers basis. The group dynamics and dialogue of the meetings featured an "asymmetry of communication" in which the personality and arguments of a few SLOs had a disproportionate impact on the course of discussions and decisionmaking. The bureaucratic orientation was sustained largely by the activities of two influential members of the SLO group. Both occupy administrative positions as metropolitan education consultants. One is involved in the production of materials concerned with "education about the environment". The other heads an education department section which

concerns itself largely with such activities as planning school plantations, school landscaping and horticulture, and dissemination of materials for "education about the environment". An interpretation of environmental education as "education about the environment" enabled these individuals to offer ready-made, efficient dissemination organisation.

Of the two orientations evident at the SLO meetings, the bureaucratic orientation "won the day". While this can be partly explained in terms of the regular roles of the SLOs, it should also be said that the problem that the SLO group was addressing presented itself as a centre-periphery distribution problem, and that the SLO group functioned more on behalf of the Centre than on behalf of the teachers who would carry the innovation in their own practice. No alternative, E.E.P.-specific, dissemination strategies emerged.

However, in the event, the elected dissemination strategies were successful in moving materials from Centre to schools, at least for the period studied in the evaluation project. The importance of the Curriculum Development Centre in dissemination is apparent in the sales figures, sales mapping, and questionnaire responses: in the period January 1981 to March 1982, nearly one thousand E.E.P. publications found their way into 432 schools spread across the country. This large-scale

process of materials movement was almost exclusively the direct result of C.D.C. activities: the questionnaire survey suggests that, during the period studied, there was virtually no movement of materials along the informal, infra-structural pathway of teacher-teacher contact. This suggests that the SLO's were not key figures in the actual dissemination of the materials.

(c) Patterns of Implementation

Two points to emerge from the sales figures are the relatively few purchases (45 schools out of 432 schools) of the complete kit (ie all four E.E.P. publications purchased at the same time) and of Walmit Divided (110 sales out of a total of 983 sales for the period studied). With the sales figures (338) for the Primary Sourcebook representing only a third of the total sales, it appears that many teachers were purchasing and using the other three publications -- largely practical activities for direct classroom use -- without recourse to the "Planning" section of the materials presented in the Primary Sourcebook. Analysis of the data by schools rather than by purchases shows that 113 schools out of the 432 to have bought the materials did not purchase the Primary Sourcebook (that is, about three-quarters did and one-quarter did not)(59) .While the presence of the Primary Sourcebook in the school is no guarantee of effective environmental education teaching, its absence precludes experience-based reflection on the relationship

between the Centre's view of environmental education, the teacher's own view, and his/her teaching practice.

The clear impressions gained through questionnaire analysis and telephone interviewing are that teachers are using the materials in support, and within the structure, of existing disciplinary programs rather than in a program of environmental education "in its own right". The criteria for selection and use of the activities presented in the materials relate more to the objectives of disciplinary programs than to the objectives of environmental education.

The questionnaire survey suggests that for teachers adopting a "teaching environmental education through the disciplines" approach, the discipline-medium is science or social studies. Activities from Streets and Exploring Outdoors, in particular, are "plugged into" existing programs in these two subject areas. These activities are seen as contributing to the development of important process skills. Some teachers believe it is unlikely that environmental education will ever be a subject in its own right: linking environmental education to an established subject area like science or social studies is seen as a means of gaining a foothold for environmental education in the curriculum. A status differential is perceived between environmental education and other, established, discipline-based subjects.

Several schools own or have access to camping and wilderness areas. Streets and Exploring Outdoors are used extensively both in preparation for camps and during the camp itself -- to the extent of basing an entire camp program on Exploring Outdoors activities. These materials are also used for other "single event" expressions of environmental education like day-long excursions and "tree weeks".

Teachers see the materials as contributing to the achievement of awareness-development or sensitisation objectives:

Streets is seen as appropriate for our grades 3 and 4's 'local environment' program, whose main aim is to make children aware of their environment. They are good for intensive observation studies.

Exploring Outdoors is regarded as useful in exploring the school environment: trees, leaves, insects, garden. It provides ideas for the teacher ... and complements other publications such as Gould League materials and science book activities.

The materials enable firsthand experience with environment: sensory and classification-type activities; understanding about the environment; knowledge of living and non-living things; basic ecological principles.

Thus the materials, particularly Streets and Exploring Outdoors, fit in with ideas of environmental education as awareness development -- of providing children with experiences in their environment. They provide opportunities for a sequence of sensitisation activities commencing at school, through the nearby urban

or rural setting of the school, to more distant sites as in camps. The materials receive extensive use, either as a source of ideas for the teacher or directly by students, and apart from some comments as to their format are viewed by teachers as a useful addition to the resources pool of activities for environmental education as awareness development.

The pattern of usage of the materials for developing awareness of the environment through the structure of disciplinary-based subject areas has another feature -- that of opportunistic use. Not only is it rarely the case that an environmental education program exists as a free-standing "subject" in its own right; it is also rare for a self-contained environmental education component of significant duration to exist as a sustained, coherent section of existing subject programs. More often, isolated E.E.P. activities are "slotted into" programs of similar activities already existing within the structure of discipline-based subjects. That is, the activities are not employed because they are environmental education activities, but because of their match with, or contribution to, existing science or social studies topics. Teachers commented:

The materials (Streets and Exploring Outdoors) are used as a resource when they are relevant to a (social studies or science) topic -- not as a unit in their own right.

Streets was used last year in our 'Transport' theme but is not applicable to this year's program.

I have used one or two of the later chapters in the Primary Sourcebook. For example, I used 'Environmental Guidelines for Schools', at a time when the children were working on a Gas and Fuel competition for low-energy house design.

Our use of Exploring Outdoors is restricted to incidental support of Social Studies and to single events like camps, excursions, 'tree weeks', etc.

Consistent with this pattern of opportunistic use of the materials as a source of awareness development activities in support of existing subjects is the request by some teachers for similar activities organised into conventional science and social studies topics. For example, a questionnaire response from a teacher at a South Australian primary school:

Teachers in our school find the books which have been most useful are those like "Exploring Outdoors" but in particular "Streets" with its Observation Starter Book idea -- something which both teachers and pupils can use and adapt. Future booklets such as Plants, Animals, Conservation, Pollution, Weather, Pioneers, Aborigines, Birds, Sea, Creeks and Rivers, Water, Earth, etc. could also be developed and then adapted by teachers.

An interesting exception to the pattern of opportunistic use was reported by a teacher at an independent primary school. At this school, each grade from Year 2 to Year 6 spends a whole term on environmental education; no science or social studies are taken during this period. There is a coherence in the program through the four year levels, with the emphasis in the lower grades being placed on developing an interest in and sensitivity for the environment, environmental awareness,

observation skills and recording skills at a "very basic level" in preparation for more involved studies of the local community in later years. In the other two terms, the more usual pattern of incorporating environmental education into science and social studies obtains.

Walmit Divided appeared to be used by fewer teachers than the other three components of the E.E.P. materials. Further, there were no reports of its being implemented in levels lower than grade 5. Questionnaire respondents and telephone interviewees who have not attempted to implement the simulation tend to regard its scenarios and profiles with suspicion, and to regard its rightful place as lower secondary school. Teachers who have used this component of the materials, however, speak highly of the interest it engenders, and of its contribution to the development of such characteristics and abilities as critical thinking, initiative, language, role-playing, argument, defence of a viewpoint, and seeing real-life situations from differing viewpoints.

(d)Reality and Rhetoric: the relationship of implementation patterns to central prescriptions

Most of the reported use of the materials accords with the Centre's descriptions of education about, in and from the environment. The type of activities which come to mind are those which contribute to firsthand experience of the immediate, local or distant environment (with the

activities of Streets and Exploring Outdoors figuring prominently on excursions and camps); to the development of environmental understandings -- whether of the informal "sensitisation" type gained on excursions or camps, or the more formal "cognitive" type such as basic ecological principles; and to the development of "fieldwork skills" such as observing, classifying, measuring, recording. Teachers are adopting a "teaching environmental education through the disciplines" approach; that is, the materials are used in support, and within the structure, of existing disciplinary programs. This approach leaves unquestioned the existing disciplinary structure of curricula.

The dominant pattern of implementation of the E.E.P. materials, then, would seem to be representative of environmental education at the technical level, and to this extent is inconsistent with the priorities for environmental education implied in the Project's rhetoric. This would seem to be the case with Streets and Exploring Outdoors in particular, because of both the nature of their suggested activities and their compatibility with existing disciplinary structures.

It would be argued that materials like Streets and Exploring Outdoors provide a means of gaining a foothold for environmental education in the curriculum, and given the "fact of life" of discipline-based subjects in both primary and secondary levels, that the above characteristics of these two publications in fact enhances the chances of environmental education becoming

established in the curriculum. This argument, however, is predicated on the assumption of sustained commitment to disciplinary-based subjects, and overlooks the problems that entrenched disciplinarity poses for interdisciplinary environmental education as "education for the environment". The technical solution to "gaining a foothold" in fact reinforces the main constraint to environmental education.

On the other hand, there is a clear relationship between teachers' perceptions and usage of Walmit Divided on the one hand, and the priorities for environmental education expressed in the Project's rhetoric. Accounts of implementation of Walmit suggest that this publication does offer opportunities for the development of critical thinking in matters of environmental policy. To the extent that this is the case, it supports environmental education at the political level, and partially corrects the "rhetoric/reality" gap that is evident in implementation of some of the other materials of the project.

Given that Walmit Divided is used to a far lesser extent than the other three publications of the E.E.P., it appears that teachers have succumbed to the problem identified by the authors of the "Conceptual Framework", namely that of combining a "through the disciplines" approach to organising and teaching environmental education with a (witting or unwitting) disregard for at least some of the objectives of environmental education. While environmental education practice based on the E.E.P.

materials takes the technical form of "education in,
about, and from the environment", there is relatively
little evidence of the more political "education for the
environment".

NOTES

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- 3.(a) Robottom, I. Report of a Study of Dissemination and Implementation of "Investigating the National Estate". Report presented to the Curriculum Development Centre, Canberra: Deakin University (mimeo) March, 1981.
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4. Smart, D. Federal Aid to Australian Schools. St. Lucia, 1978 (quoted in Greenall, A. Environmental Education in Australia: Phenomenon of the Seventies. Canberra, Curriculum Development Centre, 1981).
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11. Interim Committee for the Australia's Schools Commission, Schools in Australia (Karmel Report). Canberra, 1973. (As cited in Greenall, A. Op. cit -- see note 5).
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13. Malcolm, C. "Science Education: Where To?" Lab Talk 28 (1): 8-11, 1984.
14. Greenall, A. (op. cit -- see note 5).
15. C.D.C. (op. cit -- see note 2).

16. Membership of the Interim CDC Council for the period 1973-1975 was Prof. G.T.Evans (Chairman); Mr. A.P.Anderson; Mr. G.F.Berkeley; Bro. P.M.Butcher; Mr. R.S.Coggins; Mr. D.D.Davey; Mr. A.V.Gough; Mr. R.P.Granrott; Dr. G.Hancock; Dr. D.Mossenson; Mr. J.C.Tozer; Mr. G.J.Spring; Mr. H.E.R.Townsend.
17. ACER. A Proposal for an Australian Environmental Education Program. Hawthorn: Australian Council for Educational Research, 1973.
18. A book based on this survey was published five years later: Linke, R.D. Environmental Education in Australia. Sydney: Allen and Unwin, 1979.
19. See Linke, R.D. (op. cit -- see note 18).
20. Both of these definitions are cited in Linke, R.D. (op. cit -- see note 18).
21. Linke, R.D. A Case for Coordination and Development of Environmental Education in Australia. Monash University mimeo, 1974 (cited in Greenall, A.: op cit -- see note 5).
22. The membership of the CDC Science Review Subcommittee was : Mr.D.R.Driscoll (chairman); Prof.R.D.Brown; Prof.P.J.Fensham; Prof.A.A.Hukins; Mr. L.G.Dale; Mr.P.J.Burford; Mr.P.S.Manchester.
23. The membership of CDC's Environmental Education Committee was: R.D.Linke (chairman); D.G.Morgan; A.J.Reid; P.W.Ellyard; J.C.Womersley; J.S.Emery; P.J.Burford; G.J.Spring; C.K.Muller; C.P.Handreck; D.A.Trathen; P.J.Fensham; J.M.Sibley; A.E.Greenall.
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37. Greenall, A. (op. cit -- see note 5).
38. The membership of the C.D.C. Study Group in Environmental Education was: Prof.P.J.Fensham (chairman); Mr.P.J.Burford; Sister K.Evans; Mrs.A.E.Greenall (Convenor); Mr.J.Hore-Lacy; Mr.L.R.Lewis; Mr.A.J.Reid; Mr. P.Sutton; Mr.E.Walker; Mr.M.J.Walsh; Mr.J.C.Womersley.
39. Greenall, A. (op. cit -- see note 5).
40. Greenall, A. (op. cit -- see note 5).
41. Skilbeck, M. (op. cit -- see note 29).
42. Greenall, A. (op. cit -- see note 5).
43. The Chief Investigator was advised by an Internal Advisory Committee comprising J. Henry, S. Kemmis, and A. Pitman.
44. Brown, L. (et al). "Action Research: Notes on the National Seminar". Paper presented at the 11th Annual Meeting of the South Pacific Association for Teacher Education. Adelaide, 22-26 July, 1981.
45. Kemmis, S. "Barriers to Change in Teaching: Some Implications for Inservice Education". Geelong, Deakin University, 1980 (mimeo).
46. Kemmis, S. (op. cit -- see note 45).
47. Geelong is a provincial city of about 160,000 people, and is located 80 kilometres southwest of Melbourne, the capital city of the state of Victoria.
48. The reader is referred to the full report on the INE study. See Robottom, I. (op. cit -- note 3). Familiarity with the materials themselves is assumed in the comments to follow -- see C.D.C. (op. cit -- note 1) for publication details. For the purposes of the present discussion, an impression of the nature of the Investigating the National Estate kit may be gained from the following statement extracted from INE's Teachers Handbook (Canberra: Curriculum Development Centre, 1980):
This kit contains resource materials about the

National Estate written for secondary school students and their teachers. The material is divided into four units which investigate various aspects of Australia's heritage, built and natural.

Unit One introduces the concept of the National Estate and discussed some of the processes and problems involved in identifying and managing the National Estate.

Unit Two looks at the importance of aesthetics in deciding what should be part of the National Estate.

Unit Three investigates our historic and cultural surroundings and fosters students' spirit of enquiry.

Unit Four investigates our natural surroundings and promotes understanding of the importance of interdependence in the environment and the need to conserve out natural heritage.

49. Robottom, I. (op. cit.-- see note 3a).

50. Fensham, P. and May, J. "Servant not Master -- A New Role for Science in a Core of Environmental Education". Australian Science Teachers Journal. 25 (2): 15-24, 1979.

51. Kemmis, S. (op. cit -- see note 45).

52. Kemmis, S. (op. cit -- see note 45).

53. The Environmental Education Project comprises four publications:

(a) C.D.C. Streets. Canberra: Curriculum Development Centre, 1980;

(b) C.D.C. Exploring Outdoors. Canberra: Curriculum Development Centre, 1980.

(c) C.D.C. Walmit Divided. Canberra: Curriculum Development Centre, 1980.

(d) C.D.C. Environmental Education: A Sourcebook for Primary Education. Canberra: Curriculum Development Centre, 1981.

54. Skilbeck, M. "Foreword". In C.D.C. Environmental Education: A Sourcebook for Environmental Education. Canberra: Curriculum Development Centre, 1981.

55. Robottom, I. (op. cit. -- see note 3b)

56. Education in the environment can occur when the environment is used as a classroom location; education about the environment usually involves a consideration of knowledge or information about a particular environment; education from the environment uses the environment as a resource either as something to be investigated or as a source of material; education for the environment aims at development of attitudes of concern for and responsibility towards the environment, and a preparedness to become involved in some form of environmentally-positive action. See Greenall, A. "An Introduction to Environmental Education". In C.D.C. Environmental Education: A

Sourcebook for Primary Education. Canberra: Curriculum Development Centre, 1981.

57. The full title of the publication is Environmental Education: A Sourcebook for Primary Education. In this context, "primary" denotes the elementary level of schooling.

58. Dench, P. "(A Review of) Greenall, A. (Coord.), Environmental Education: A Sourcebook for Primary Education, Canberra: Curriculum Development Centre, 1981, pp184. Paperback", Curriculum Perspectives 2(3): 92-93, 1982.

59. The apparent contradiction here is illusory. Nearly all schools which purchased the Primary Sourcebook purchased one copy only, whereas multiple purchases of the other publications were more common. Thus, while 319 out of 432 schools purchased Primary Sourcebooks, the sales of that publication represented only a third of total sales.

CHAPTER 5: LOCAL DEVELOPMENTS

This Chapter will present two accounts of the environmental education work of teachers whose environmental education activities are the result of local initiatives: a project undertaken by a group of teachers representing urban secondary schools (the Geelong Secondary Cluster Group); and a project undertaken by a group of teachers representing mainly urban primary schools (the School-based Environmental Education Project).

5.1 Environmental Education in Secondary Schools: The Geelong Secondary Cluster Group (GSCG)

Introduction

The Geelong Secondary Cluster Group came into being in May 1981 at the completion of the Investigating the National Estate (INE) study (see Chapter 4). In a sense the consolidation of the GSCG was an evolutionary process, since the Group 'inherited' some of the INE cluster group membership and its focus of inquiry.

The GSCG was varied in its membership. Rosa had an environmental science academic background which she was "keen to put to use in the classroom". She claimed, however, to be continually frustrated by the strictures of the traditional, content-dominated obligatory curriculum existing at junior levels at her Catholic college. Rosa

felt she had no room to move, and no curriculum freedom; she joined the group primarily to ascertain "what other schools are doing", in the hope that she would be able to change her circumstances (even if this meant changing the school). Bob was history/social studies coordinator at a technical high school which offered only year levels 7 to 10. He possessed a certain amount of curriculum freedom, and was in a position of being able to influence the direction of his school's curriculum. He was informed about and sympathetic towards such notions as individual student inquiry, school-based curriculum development, and action research. Chris, Syd and Geoff all taught at the same local high school. Chris taught junior and senior science and had an academic background in curriculum research and development. He was working with Syd on the development of an environmental education unit at their school, and had been a regular attendee at environmental education conferences. Syd was involved in environmental education, geography and history; Geoff's main teaching responsibilities lay in the geography area.

The main link between participants in the GSCG, and between the GSCG and the INE investigation, was an interest in the development of an "issues-based" program in environmental education in secondary schools as this notion was partially developed in the INE study. Bob and Syd, both "survivors" from the INE investigation, believed that the "issues-based" concept emerging from the INE study had relevance to their professional settings, and were keen to continue to explore the potential of the

approach. Methodologically, the approach adopted in the operations of the GSCG was similar to that of the INE, with some changes resulting from reflections on that investigation.

Methodology.

The activities of the GSCG were based on the notion of action research. The definition of action research adopted in this study was one developed at the National Invitational Seminar on Action Research held at Deakin University in May 1981(1):

Action research is a term which is used to describe a 'family' of activities in curriculum development, professional development, school improvement programs and systems planning and policy development. The 'family' of these activities has in common the identification of strategies of planned action which are implemented and then systematically submitted to:

- (a) reflection,
- (b) observation, and
- (c) change.

Participants in the action being consideration are integrally involved in all of these processes.

This definition of action research embodies the phrase "a family of activities", implying that operational forms of action research differ from context to context. The steps outlined below were proposed as a tentative sequence to be followed in the context of this study, and was in no way advanced as a prescriptive "recipe" for general application. Even in this study, it was only loosely followed, as determined by emerging constraints during the course of the study. It did, however, represent an attempt at forward planning based on the experiences gained in the

earlier application of the cluster-based action research and development model (see Chapter 4).

1. Identification of key descriptors of EE (as understood by the group).
2. Negotiation of meanings of descriptors and compilation of a glossary of stipulative terms.
3. Articulation of issues, barriers, and possible action steps using the negotiated glossary as background reference.
4. Application of glossary as a framework for analysing "secondhand" (non-participant) materials:
 - i) to obtain practice in analysis;
 - ii) to gain a perspective on the materials;
 - iii) to obtain feedback on the efficacy of the glossary as an analysis framework;
 - iv) to suggest early action steps.
5. Plan initial strategic action (with the glossary as the primary source of planning).
6. Observation: monitor strategies-in-action.
7. Reflection:
 - i) apply analysis framework to accounts of strategies-in-action;
 - ii) identify curriculum or teaching issues;
 - iii) identify assumptions underlying issues.
8. Revision: in the light of reflection, revise subsequent strategies and the analysis framework.
9. Repeat cycle of steps 5 - 8.

The main difference between GSCG operations and the INE investigation was that the methodology employed in the GSCG operations involved a greater emphasis on "stabilising" the dialogue at cluster meetings. Steps taken to facilitate this emphasis were a reduction in cluster size (with all members expressing a commitment to environmental education curriculum development), the maintenance of records of the dialogue of meetings in the form of tape-recorded transcripts, and an immediate attempt to develop an explicit "common language" of environmental education.

Kemmis(2), in outlining the cluster-based action research and development (CBARD) model, states that

"multiple school involvement is crucial because it means that participants must develop common languages for describing the problems or issues at hand". In the INE study, despite multiple school involvement and the existence of a need for a common language (different participants were ascribing different meanings to different terms), a common language was not explicitly formulated.

It was intended in the application of the model in the GSCG, that the facilitator take a more directive role in assisting the group of cluster participants to develop an explicit common language. (The role was to be "directive" in the sense of encouraging the process of common language development, not in the sense of ensuring that a particular language be developed). The process as seen as including the identification of key descriptors at the field of action, and the negotiation of mutually agreed meanings to those terms. In addition to facilitating a common understanding of the key dimensions of the field of action (as perceived by the group), the common language was to be used as an analytic framework when reflecting on actual classroom practice.

Summary of Proceedings.

The GSCG met every three weeks for six months. At the first meeting, the issue of a language for environmental education was raised by the facilitator. It was agreed that there was a need for a set of terms whose meanings

had been negotiated to a point of mutual agreement, and which could act as a framework for discussion. It was clear at this first meeting that key terms such as "environmental education/studies/science", "interdisciplinary" and "multidisciplinary" were used differently by different people. A strategy for succeeding meetings was developed:

- (i) consider a number of authoritative statements about environmental education;
- (ii) from these statements identify a number of key descriptors of environmental education;
- (iii) develop a common language from these descriptors -- that is, for each descriptor negotiate a meaning acceptable to all members of the group;
- (iv) apply this language in the analysis of existing materials and programs in environmental education;
- (v) apply the language in the analysis and self-evaluation of our own development in environmental education -- that is, in the modification and development of our teaching and curriculum practice;
- (vi) develop a series of environmental education strategies embodying the concepts of the language;
- (vii) in the light of reflection on strategies-in-action, modify the language.

This strategy was commenced in the second meeting, at which a list of descriptors of environmental education was compiled. These descriptors were identified after consideration by participants of a number of statements about environmental education emanating from the

Belgrade(3) and Tbilisi(4) conferences and the Curriculum Development Centre(5). In the second, third and fourth meetings, meanings to these descriptors were negotiated to a point of agreement by all participants. This process was a protracted one. Typed transcripts of discussions were circulated to all participants, in order that participants could reflect on the various meanings ascribed to terms during discussions. A progressive glossary of descriptors and meanings was maintained. In the fourth meeting, an attempt was made to refine the developing list of descriptors into a set of dimensional criteria which could be used by participants for analysing existing programs in environmental education and for suggesting strategies which can build into an effective program. This again was a protracted process, and again the process was facilitated by circulating typed versions of the criteria (the set of which was at this point termed "an environmental education analysis framework") together with transcripts of the discussions which generated them. Figure 1 presents the "common language" to this point, in schematic form.

At this point the process of developing a "common language of environmental education" had occupied four meetings. The process of refinement in the absence of practice could have continued, with the danger of the common language becoming seen by all participants as an end in itself, rather than as a means to critical self-reflection. It was decided at the fifth meeting to change the pattern of operations -- to place the emphasis

- 1 The program is **INTERDISCIPLINARY**

Developing inquiry skills from one discipline	Developing inquiry skills from a number of disciplines
Emphasis of program	

- 2 The program is concerned with developing **ENVIRONMENTAL ATTITUDES**

The program "pushes an environmental line" (it strongly promotes a <u>particular set of</u> attitudes)	The program includes values-clarification activities

- 3 The program is concerned with increasing **ENVIRONMENTAL AWARENESS**

The program presents environmental content	The program exercises fieldwork skills

- 4 The program is **ACTIVITY-CENTERED**

No scope for students to direct own investigations	Scope for students to exercise inquiry skills in an autonomous fashion
Type of activities in program	
Never	Often
Students are engaged in outdoor activities	

- 5 The program is **ACTION-ORIENTED**

Absent	Present
Possibility for action	

- 6 The program **INVESTIGATES ENVIRONMENTAL ISSUES**

No consideration of concrete issues	Prespecified concrete issues are presented as content with no opportunity for investigation	Program includes direct investigation of issues

- 7 The program enables **PRACTICE IN DECISION-MAKING**

No identification of key decision-makers in issue under study	Students are required to identify key decision-makers
Problem-solving investigations comprise analytic, fact-finding activities only	Students are required to formulate their preferred "solution" to the issue under study

upon the trying out of strategies, monitoring of practice, and reflection upon practice. It was agreed that this process begin at the next meeting with analysis of a "second-hand" example of environmental education (that is, application of the analysis framework to the practice of individuals outside the cluster group -- a non-threatening beginning to what is potentially a threatening process of self-reflection).

In the sixth meeting the analytic framework was applied to two "second-hand" examples of environmental education programs. Two participants indicated their intention to "try out" some strategies for dealing with issues raised during analysis of the "second-hand" examples, and to report to the cluster group at the next meeting. At this stage, then, the group's activities had comprised reflecting upon the meanings of key terms in the field, analysis of others' practice, and planning of personal action. Reflection on personal practice had not occurred.

Reflection upon personal practice began in the seventh meeting and continued over the last two meetings. In this two-month period, several participants reported to the cluster group on their own practice. Verbal reports, written reports, videotapes and transcripts of lesson dialogue were provided by participants. These were reflected upon in the terms of the analytic framework. A number of substantive issues were identified -- for example, the nature of the relationship of environmental education to other subjects; the problems and prospects of

teacher activities such as "neutral chairmanship"; the nature of barriers to extensive, sustained environmental education. Aspects of environmental education deemed to be important enough to figure in the analytic framework continued to surface; the analytic framework was refined and extended over the period of the teachers' interactions with the materials. The GSCG's activities ceased in December.

Substantive Issues

By "substantive issues" here is meant issues concerning environmental education, as distinct from issues concerning the cluster-based action research methodology used in this study. This section is concerned with presenting a view of environmental education -- the view developed and mutually endorsed by the GSCG -- together with implementation issues and perceived barriers identified by the group as attempts were made to express that view in their everyday teaching.

The view of environmental education held by the GSCG at the end of its operations is embodied in the analytic framework developed by that group. Frequent reference will be made to the framework in the discussion to follow. The framework contains the group's perceptions of the "essential components" of environmental education expressed as descriptors with associated meanings. Thus the framework represents "what environmental education ought to look like" for this particular group of

practitioners. Since the descriptors and meanings were identified and negotiated to a point of consensual agreement by participants in the group, the view of environmental education embodied in the analytic framework is "owned" by the group, and may be idiosyncratic in the sense of not meeting with the agreement of other groups of practitioners in other circumstances. The discourse of the group in generating the analytic framework also "brought into the open" the problematic nature of the view of environmental education eventually held by participants: a number of implementation issues and perceived barriers were identified during development and application of the framework.

The framework presented below (see Figure 2) comprises ten criteria. Each criterion is arranged as a dimension, with alternative interpretations of the criterion at opposing ends of a continuum. The interpretation favored by the cluster group appears at the "right-hand end" of each dimension. The following presents samples of the discourse relating to some of the dimensions of the framework.

Interdisciplinarity

The argument for environmental education to be interdisciplinary was based on a dissatisfaction with the short-term, fragmented treatment it tends to receive at present:

Rosa: I'm really opposed to that (the short unit approach). You don't sort of do it as a little unit, it's meant to be over the whole course, and

(These criteria are necessary, long-term characteristics of an environmental education program)

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it's meant to be all brought in together, and they're not doing it -- they're making it a separate little unit. Well basically what they're doing is introducing all those terms and bombarding the kids with all these new ideas -- it's too quick and they virtually keep it in the classroom. (Transcript of Meeting 1).

When attempting to negotiate a meaning for "interdisciplinary", the group found it had to try to work out a meaning for "discipline" first. The distinction was made between two aspects of discipline -- its "established body of knowledge" (that is, its content of facts, concepts and theories), and its "set of inquiry skills" (that is, the means by which the content is produced). The view emerged that environmental education ought to be interdisciplinary in the sense that it develops inquiry skills from a number of disciplines, or that it presents content from a number of disciplines.

In searching for a mutually-agreeable meaning for "discipline", members of the group drew upon their recent experience in teaching discipline-based subjects, and in doing so revealed some assumptions about curriculum which influence their reactions to a curriculum innovation like environmental education. The discussion referred to the recent "Secondary Historical Education Project" (S.H.E.P.) which places an emphasis on the development of historical inquiry skills. The following is an extract of that discussion:

Syd: S.H.E.P. is trying to develop inquiry skills. It's not trying to develop knowledge, it's trying to develop skills -- their ability to take information and translate it and learn from it.

Bob: It's probably making us try and focus the

skills, and the knowledge, and so on.

Syd: My criticism of S.H.E.P. is that it gets too far away from any knowledge at all. I think the kids like the idea of occasionally getting something concrete in front of them.

Geoff: It's ahistorical.

Ian: It's ahistorical if it's without content? In what way could the S.H.E.P. program be described as ahistorical?

Syd: Well, it comes back to the definition of history, I suppose. If history is studying and learning from the past...is that a fair definition of history?

Bob: It's studying the past, probably with a view of coming up with strategies for coping better with the future, with some kind of projection into the future.

Syd: The way the S.H.E.P. program works, is that you can teach a whole five, six levels of S.H.E.P. and not do anything in the slightest bit historical the whole time, as long as it is inquiry-based.

Bob: The S.H.E.P. program will also claim to be conceptual-based, particularly themes like the concepts of time, change and continuity.

Ian: What are the names of some of the S.H.E.P. units that have been developed?

Syd: One is "Why have techniques of surgery changed?"

Ian: The prime focus in that program was to develop in students an approach to analysing data. They're not doing it in the absence of content, surely? At the end of it they will know something of surgery techniques?

Syd: Sure. That's the way I believe it should be -- having a content base. Someone else would possibly take that, the same topic, and come up with a perfectly legitimate unit within the S.H.E.P. framework, which had absolutely no content base like that at all...no historical content in it.

This extract shows that there are differences in how an innovation is perceived by different teachers. Syd and Bob agree that S.H.E.P. is primarily concerned with skill development. Syd is concerned about the lack of knowledge, or content; Bob seems unconcerned about this, and recognises that S.H.E.P. is aimed at development of historical concepts (change; continuity) as well as skills. Their different reactions seem to be based upon a different conception of "discipline". Syd and Geoff tend

to evaluate a program in terms of its knowledge content, and to view the disciplinary (in this case, historical) quality in terms of substantive content. The absence of knowledge is equated with an absence of disciplinary quality (Geoff: "It's ahistorical"), and a prime emphasis upon inquiry skill development is equated with a lack of disciplinary quality (Syd: "...not do anything in the slightest bit historical the whole time, as long as it is inquiry-based"). These comments reveal a view of "discipline" which values the substantive structures ("knowledge"; "content") and devalues the syntactic structures ("inquiry"; "skills").

Bob: You're touched there on a very interesting sort of thing there at the moment, because just thinking about a couple of people who run around our school, and cry "Let's try something interdisciplinary, integrated" and all sorts of other things. Yet the context of what they're usually talking about, or what they're usually on about, is just the content ...usually they're always talking in the language of content.

The pervasiveness of the influence of disciplinary thinking (that is, thinking which values programs in terms of their disciplinary content) in dialogue about environmental education was further instanced in the GSCG. A number of barriers cited as standing between the status quo and a sustained environmental education program were construed as such from a perspective which took for granted the prior importance of discipline-based subject and, within those subjects, of disciplinary content. An example occurred in cluster meeting 4:

Chris: Now this is what I see as a pressure on subjects to keep reasonably within the bounds of what they're there for. Ah, within science I

think we can stretch the boundaries a bit but then you can't go off and do an historical analysis with any real justification under the umbrella of science.

Ian: You are saying that this is a problem for trying to teach something interdisciplinary in the time allocated to a subject?

Chris: Yes. And, I suppose, the moral obligation. You're there to teach science or teach geography and you can't draw on art and politics and all sorts of things to the fullest extent that probably a subject deserves or a topic deserves (Transcript of meeting 4).

The assumption which seems to be underlying Chris' comments is that conventional discipline-based subjects possess some greater inherent worthwhileness and purposefulness which is in danger of being sullied in some way by involvement in interdisciplinary work -- and further that teachers have a moral obligation to preserve those unique qualities of the disciplines. Other work, like interdisciplinary environmental education, is regarded as being of lesser importance, and a threat to "disciplinary time":

Chris: But how far can you go and still justify that you are teaching geography and not something other than geography in geography time?

Geoff: If the students get something out of it, what does it matter?

Chris: Well, some people would argue that you have to justify how you spend your time teaching certain subjects, and as soon as you get too drastically off the rails, they would be prepared to say so...

Syd: It (environmental education) is a "fringe subject". I've had that explained a dozen times in the last two years.

This sort of "disciplinary chauvinism"(6) is a major issue for environmental education. At present (at least in the experience of the GSCG participants), disciplinary thinking is responsible for environmental education being forced into the framework of existing discipline-based

subjects, usually science or geography, because it doesn't have the "esteem" to obtain recognition in its own right -- and at the same time this is viewed as a threat to the existing content of the "mother" subject:

Syd: What worries me is that it invariably comes up that environmental education fits into either science or geography, and then you get a scream from both parties that it's cutting out something of the traditional science or geography course. That's the problem (Transcript of meeting 2).

In an attempt to minimise the influence of "disciplinary chauvinism", the group decided to interpret an "interdisciplinary" program as one in which "no attempt is made to restrict inquiry-skill development, or content development on disciplinary grounds". This definition reflects the feeling of the group that the main barrier to an interdisciplinary program is prior commitment to the objectives of a discipline-based subject area.

Environmental Attitudes

The group recognised the dilemma of wishing to promote the development of a set of environmentally-positive attitudes in a democratic society. There was the recognition that the attitudes of the teacher -- or any authority figure -- are unavoidably communicated to learners through the teacher's actions, interests in environmental issues, and general demeanor:

Syd: The kids just learn from looking at you, so if you have given them a concerned attitude about something, or you are showing them that you are concerned about something, then they will get the idea (Transcript of Meeting 3).

The group considered it improper, however, to attempt to

consciously and coercively impose teachers' values upon learners. In any case, attempts to "instruct" learners in "appropriate" attitudes are confounded by the ability of students to "turn on" behaviours indicative of attitudes perceived as being sought by particular teachers:

Chris: And then you'd be likely to have your students realising, "Sir wants that kind of attitude, so I'll give it to him while I'm in class". Last year I got that response from a number of the Level 10 students when I was going through the 'National Estate' with them. I said it wasn't going to be a very heavy subject, it was mainly looking at issues and that sort of thing and they gave me the attitudes I wanted. It was so painfully obvious (Transcript of Meeting 4).

The position arrived at by the group was that an environmental education program could only provide experiences, and hope for attitudinal changes along environmentally-positive lines. The experiences provided should be such that involvement in them leads students to a more developed self-awareness of their personal values held in respect of the environment.

Environmental Awareness

The teaching of knowledge is not problematic in conventional schooling. There is no shortage of texts and resources to support the provision of factual content to learners. In the light of the need for an environmental education program to be interdisciplinary (as this was understood by the group), if improved environmental awareness is sought through means of provision of content, then the content ought to be chosen independently of previously-existing commitments to discipline-based

subjects.

The group recognised that the various subject areas which would be drawn upon in providing information about the environment and environmental issues (for example: science, geography, economics, politics) contain information which varies in its environment-relatedness:

Bob: There is obviously the situation where the content or the knowledge is just non-related to environment at all. In other words it could be music, for example.

Chris: Perhaps a second dimension, chopping all disciplines to bits...down one end having the non-environmental oriented areas in the subject and at the other end having the very-environmental areas of the subject. So if you were constructing an environmental education course you'd take the areas from one end...and put them together into a multidisciplinary approach.

This concept of "creaming off" the environment-related materials from a number of "servant" subjects to form an interdisciplinary program in environmental education is reminiscent of a model for "environmental education as core" developed by Fensham and May(7).

In the earlier discussion of "interdisciplinary", the distinction had been made between two features of disciplines -- their content and their inquiry skills. It was argued that environmental awareness can be improved by exercising inquiry skills in the investigation of an environmental matter -- and in fact this was felt to be an educationally favourable approach:

Chris: Problem solving fosters deep thoughts amongst the kids -- you know, what they are doing -- they come to stronger conclusions than if

they're just told "Here's a chapter of facts to learn".

Activity-centred

There is the obvious sense in which environmental education ought to be activity-centred -- in order to provide direct experiences with aspects of the environment for the purpose of developing or improving environmental awareness. The group tended to concentrate more on the potential of activity-centred programs for exercising inquiry skills in problem-solving situations. There was a developing notion of the need for development of learner-independence in environmental education. The point was made that a program could be activity-centred and fail in its intent to develop independence if the activities are too structured and directed:

Geoff:(An) "activity-centred" (program) could be passive, too. Say an experiment in science, and the students are told to do certain activities. They may perform the tasks but they are not understanding what they are doing, and not gaining from it. They're active in that they're not sitting down. But they are still passive recipients.

Bob: Like an assignment sort of thing, that is teacher-directed.

This discussion touched on the importance of the role of the teacher -- an issue which was to be explored further in later meetings.

Action-oriented

The group felt that an environmental education program should provide opportunities for involving the learners in making some form of commitment in respect of the environment. It was felt that learners ought to be

required to make a decision about what action they would take in resolving a particular environmental issue. There was debate among the group as to whether "action-oriented" ought to mean "formulating an action plan" or actually undertaking "action":

Bob: Maybe not (action) that they put into practice, but they undertake the study in the first place with a view to exploring possible courses of action, with the possibility that they could be pursued. It's slanted towards the possibility of action rather than actually meaning action.

Issues-based

A notion that was implicit in discussions about the descriptors listed above was that an effective environmental education program needs to be issues-based. The notion of an issues-based program was beginning to take on a more definite form by the end of the fourth meeting. A program was "issues-based" if it employed a local, current environmental issue as a means for engaging learners in interdisciplinary work which actively exercised inquiry skills from a number of different disciplines, improved their awareness of an aspect of their environment, and required them to make a decision about appropriate action in respect of an environmental problem.

Two concerns raised by the group were:

"Who chooses the issues that are to form the basis of an environmental education program?"

"How can teachers avoid the situation where the values they hold in relation to a particular environmental

issue shape the responses of pupils to the issue?"

In relation to the first concern, it was recognised that as much as possible, the teacher and pupils ought to investigate issues of interest to the pupils themselves. The reasons for this were not only that motivation and effort may be associated with interest, but also that it is in the interests of improved critical thinking for pupils to be responsible for negotiating the object of their learning experiences. In practice, however, great difficulty was experienced in identifying an environmental issue that could be tackled (that is, was close enough to the school) and was of interest to most of the class. Bob, in particular, tried to arrive at an issue through democratic means.

The second concern was addressed through the simulation game Walmit Divided. Syd had explored the role of "neutral chairperson". It was noted that while management difficulties arose, pupils showed an improved ability to put their points of view and argue for them when the teacher made a conscious effort to suppress his own substantive (that is, issue-related) perspective:

I think there were 3 or 4 different suggestions made, and each attracted a fair amount of support. The fact that there wasn't a consensus of opinion wasn't terribly important. The kids displayed the confidence to get up and state their views.

Methodological Issues

Sensitivity of the Model

The experience of applying the cluster-based action research and development model (CBARD) in the GSCG has shown its sensitivity to issues concerning educational practice. The range of issues identified above reveals the capacity of investigations conducted on the CBARD model to get "close in" to fundamental practice-related matters. The understandings derived are outcomes of reflection upon practice by classroom teachers in their conventional settings -- for example, the importance of "neutral chairmanship" activities on the part of the teacher when engaging in real or simulated investigations of environmental issues. There is no attempt to "standardise" the teaching settings of participants in this research: a recognition of the marked differences between Rosa's circumstances in her traditional Catholic college and Bob's situation in his new technical high school was important in understanding the role of institutional constraints in influencing the survival prospects of an innovation. Further, the group's increasing awareness of the strength of institutional constraints such as a disciplinary structure of curricula and a recitational teaching style reveal the critical potential (the ability to mount a critique of usually taken-for-granted features of settings) of the CBARD model. The model's sensitivity to the complexity of educational settings is shown by the nature of the "outcomes" of the group's operations -- the

understandings of practical issues which are themselves complex and interwoven, and which changed over the duration of the group's operations.

The Common Language

The problematic issue of the development of a "common language for describing the problems and issues at hand" -- a focus of this work -- has been informed to some extent by the experience with the GSCG. The reason for attempting to develop a common language in the GSCG operations resides in the action research character of the CBARD model. Action research is based on the democratic principle of investigating issues of mutual interest and concern: "at its best, action research is fundamentally concerned with democratic values as these are expressed in the idea of a self-reflective community. In this sense, it is anti-hierarchical and anti-authoritarian"(8). This democratic principle can be preserved only if all participants share an equal opportunity to influence discourse. That is, the achievement of the democratic principle involves the establishment of symmetrical communications within the action research groups. (Symmetrical communications "aim at respect and understanding by group members of one another as persons appreciated in their common striving for consensus and improvement"(9).

The cluster-based action research model(10) brings together teachers from several schools at a time, often

with several teachers from each school. Initially at least, the individuals comprising the cluster group share only a loose association with a particular curriculum interest or concern. The background of individual participants is likely to be disparate: number of years' teaching experience, subject speciality, formal educational training (both in type and extent), and motives for wishing to attend cluster meetings may all differ.

In discussing group-based action research, Henry(11) makes the general point:

Individual group members can be expected to have different levels of awareness about the issues relevant to the group's shared interest. Group members are going to differ in their grasp of related concepts. Communication within the group at a level of tight detail may prove difficult. The teachers may experience difficulties and frustration when communicating to others about their own teaching practice. These problems could arise due to the loose definitions teachers apply to commonly-used educational terms and the under-developed curriculum concepts within the group.

The varied backgrounds of participants in cluster based action research groups pose problems for the establishment of symmetrical communications. Symmetrical communications cannot obtain in a setting in which individuals have differing degrees of comprehension of the curriculum concern, wittingly or unwittingly give different meanings to key terms, and generally "talk past each other". This sort of distorted or confused communication results in a power asymmetry within the group, where one or more members of the group can push through particular points of

view on how language should be used or what action taken. In action research groups where teachers are researching a mutual problem, there is a need for a common labelling of concepts and a common language of description.

In the Geelong Secondary Cluster Group, it was clear at an early meeting that terms which participants agreed were key descriptors of the field of environmental education were being ascribed a range of meanings. An example of this kind of communication problem occurred in a discussion at the second GSCG meeting of the term "environmental education" (see the extract discussed in Chapter 6) and the term "interdisciplinary". For example, while all participants agreed that a complete environmental education program ought to be interdisciplinary, the perceived entailments of that agreement differed:

Ian: "Interdisciplinary": let's just pick up that one. What does that mean to us?

Syd: Say, that biology and geography are one.

Ian: So, it's a study that embraces a number of disciplines?

Syd: I think that's what it means...

Geoff: There's a distinction between "inter" and "multi" disciplinary...

Ian: Right, I think that's crucial.

Syd: "Interdisciplinary" is looking at the same problem in a number of different subjects;

"multidisciplinary" is taking one problem and showing a different aspect of it.

Chris: Or bringing all the disciplines to bear on the one place.

Geoff: So, we are talking about using all the collective wisdom of people in physics and chemistry and geography, and the like. You are also talking about a more formal situation, aren't you? Disciplines are...formal institutions...or imply writing down what eminent people and others have come across since the year dot.

Chris: Surely, in a school situation it would be similar to saying, well, "interdisciplinary"

would be taking the same sort of problem and leaving the political aspect for the politics class and leaving the economic aspect for the economics class.

Syd: Isn't that "multidisciplinary"? (GSCG Meeting 2)

In the event, the approach adopted by the GSCG in attempting to develop a common language was to:

- (i) compile a list of key descriptors of the field of action;
- (ii) record the range of meanings ascribed to each descriptor in a discussion about the meanings of the terms;
- (iii) present each descriptor and its associated meanings as a dimensional criterion;
- (iv) reach agreement on which particular meaning of each descriptor is "most appropriate" in the context of environmental education.

Steps (ii) and (iii) provide a mechanism by which differing understandings of the meanings of terms could be made explicit in a non-threatening manner, as the collection of dimensional criteria resulting from these steps is a useful end in itself, providing a (temporary) analytic framework for diagnosing early attempts at environmental education. The increased complexity of an analytic framework comprising dimensional criteria presenting a range of positions enhances the diagnostic process of critical self-reflection -- there is the possibility of charting progression (improvement in the teachers' own terms) on each criterion over time.

By the end of cluster meeting 4, it was apparent that this approach improved the opportunities for all participants to clarify and chart their respective understandings of the meaning of each descriptor -- a clarification process was enabled without the immediate negotiation involved in generating a single meaning for each descriptor. This approach seemed to be less threatening as it involved the presentation of a perspective and not a defence of that perspective.

The process of developing a common language interacts with the development of symmetrical communications, and is itself predisposed to the effects of anti-democratic factors such as perceived status and commitment differentials. It is through discourse aimed at development of a common language that the state of symmetrical communications is approached -- a state in which participants share the same semantic tools for describing and analysing their effect on the field of action. The facilitator in particular is in a position of relative power by virtue of his role in compiling written accounts of discussions, his perceived status, and (possibly) his commitment to the area of substantive interest.

The Role of the Facilitator

The role of the facilitator in the process of common language development is a factor in determining the type of action research that eventuates. Grundy and Kemmis(12)

distinguish between three "ideal types" of action research. Profiles of these three types are as follows:

(i) "technical" action research

- participants are co-opted by a facilitator into exploring an aspect of their practice;
- a technology of group dynamics is employed to create and sustain group commitment to the project;
- the action researchers are or become dependent on the facilitator;
- the criteria by which progress towards effectiveness may be evaluated pre-exist in the mind of the evaluator.

(ii) "practical" action research

- participants monitor their own educational practices with the immediate aim of improvement and the general aim of developing professional wisdom;
- the criteria for improvement are generated by group members individually and in the language community they create for each other;
- their monitoring is directed at improving their understandings -- in the process, their criteria for improvement will change;
- the facilitator's role is that of encouraging practical deliberation while systematically transferring ownership of the method of self-reflection to participants.

(iii) "emancipatory" action research

- aims at emancipation of participants in the action from the dictates or compulsions of tradition,

precedent, habit, coercion or self-deception (in addition to the aims of improvement and development of professional wisdom);

- criteria for improvement change as those involved change their perspectives collaboratively;
- it incorporates a social perspective which goes beyond the development of the profession and the social relations of education;
- it provokes a critical response to the organisational constraints that limit change to the level acceptable within the confines of the status quo;
- the role of the facilitator is that of moderator: there is no long-term dependence of participants on the facilitator.

"Technical" action research facilitators will control the common language development process. Their pre-existing view of the criteria by which progress is evaluated will probably cause them to ensure that certain key terms figure in the common language, and that their understood meanings are associated with those terms. More importantly they will resist any attempts (or ignore signs of the need for) review and revision of the analytic framework which is based on the common language. Preservation of "their" criteria in the analytic framework is an operationally astute means of ensuring change in practice in their desired direction. Practical or emancipatory action researchers may unwittingly influence the development of the initial common language/analytic

framework (as may any participant), but in both cases they will actively structure the group's operations to enable the revision of the common language/analytic framework. They will also monitor the discourse with a view to identifying shifts in the usage of terms, and the replacement of some by others; responsibility for this monitoring task will gradually be transferred to all participants. An issue that remains for the non-"technical" action research facilitator is whether to foster continuous revision of the analytic framework, or to engage the group in revision in "fits and starts". The latter approach would involve consciously holding the analytic framework fixed for a period (this has the advantage, as in "technical" action research, of assisting progression by stabilising discourse) until a number of anomalies arise, and then abdicating the "old" framework for a new one which better suits the evolving perspectives of participants.

Resistance to Action

Another issue of relevance in a discussion about the effectiveness of the CBARD model is the difficulties that participants experience in moving from the "planning" phase to the "action" phase of the action research cycle. This issue emerged from meeting 6 onwards. At this stage, participants had generated a satisfactory analytic framework -- that is, common ground had been reached in respect of key descriptors and their meanings -- and the framework had been "tried out" on "second-hand" examples of environmental education programs. Further, some

strategies for addressing the issues thrown into relief by the framework ("thrown into relief" because of the obvious disparity between the kind of environmental education implied by the criteria of the framework and the pattern of participants' own environment-related teaching) had been advanced.

This, then, was a crucial stage in the process -- participants were "on the brink" of entering the action phase -- of exposing their practice to scrutiny. The group understood the interpretation of environmental education that they had mutually generated, and recognised some of its entailments in terms of changed practice -- and began to "rebound" from the barriers constituted by (hitherto publicly unexamined) assumptions that constrained their practice. Two such barriers advanced by participants at this stage were:

- (i) the perceived primacy of planned content of existing syllabuses over related environmental education activities regardless of how arbitrary or how problematic the criteria used in the initial planning of those syllabuses may have been;
- (ii) the perceived need for treatment of pre-determined content (factual material) to make possible continued "objective testing" in the interests of fair assessment of students. Environmental education activities were seen as not offering worthwhile "assessment fodder".

A suggested modification to the analytic framework was advanced at this stage (meeting 6) that could have been

related to the feeling of reluctance to enter the "action phase". It was suggested that the sentence, "These criteria are necessary, long-term characteristics of an environmental education program", be included at the beginning of the analytic framework. While the statement was a fair one, and affirmed participants' support for the criteria of the framework (these being seen as "necessary"), the adjective "long term" could be seen as a way of "taking the pressure off" the move towards changed practice.

The issue is an important one for the CBARD facilitator: how the facilitator reacts to the situation determines in part the character of the action research -- whether it be "technical" or "non-technical". To react by strongly affirming the need for immediate attempts at strategic action consistent with the existing criteria of the framework serves to establish an authority hierarchy within the cluster group -- to undermine its communications symmetry. If successful, this tends also to increase the dependence of the group on the facilitator; if unsuccessful the group is destabilised and possibly fragmented. This reaction also to an extent "reifies" the framework by suggesting that the criteria it embodies (that is, the criteria by which progress towards effectiveness may be measured) possess some prior importance in the mind of the evaluator. To react in this way confers a "technical" character to the action research. The alternative, of course, is for the analytic framework to be modified as participants collectively see

fit. The very fact that modifications occur in the face of imminent strategic action may imply something artificial (technical) in the process by which the framework was initially generated; or it may be a function of improved understanding of issues. In either case, the possibility for change in the criteria making up the framework is necessary for the "non-technical" character of the action research to be maintained.

For this reason the time scale of action research aimed at investigation of implementation-related innovation issues must be left open if the action research is to be of "non-technical" character. Greater understanding of educational change through critical reflection on personal action is necessarily a protracted affair.

5.2 Environmental Education in Primary Schools: The School-based E.E. Project (SBEE)(13)

Introduction

This project was shaped in part by the experiences of the Geelong Secondary Cluster Group(GSCG). Like the GSCG, the SBEE was concerned with local initiatives in environmental education, and maintained a dual focus on environmental education issues and educational research.

The environmental education issues that were the focus of this project were those concerned with actual classroom-level educational practices, rather than, for example, issues to do with materials development and dissemination. It was in this sense also that initiatives undertaken in this project were school-based: ideas and materials about environmental education used in this work were not accepted as "good" or "workable" simply because they were in print or had allegedly "worked" in other sites. The applicability of ideas and materials about environmental education in particular settings represented by teachers in this project was treated as problematic -- as something to be tested through their practice. Thus, understandings about environmental education which took shape in this project came out of teachers' professional activities for the improvement of personal professional practice and of the program and institution within which that practice occurred.

Like the GSCG, the SBEE project attempted to involve teachers in collaborative action research, though on this occasion the practitioners were all from primary (elementary) schools. The classes involved in the project included one preparatory grade (that is, the first year of compulsory schooling), one Grade 2, two composite 5/6 Grades and two Grade 6's. Five schools provided these six classes with locations ranging from a small country town to suburban schools in two small cities. School populations varied from 70 to 680 and class sizes from 18 to 33. There was also some variation in the nature of the grades with examples of both traditional to open plan and some team teaching situations.

Teachers were actively involved in the research and in thinking critically about their role as researchers. To make this point more clearly, consider the role assigned to teachers in much contemporary educational research: the teacher is relegated to a position of technician in carrying out the "treatment" (environmental education) as requested by the outside researcher. A marked division of labour exists: the teacher is excluded from research design, reflection upon "results", and from post-research decision-making(14). A particular methodological emphasis in the SBEE project was on teacher control over the process of monitoring of personal practice. Thus, an attempt was made in this study to replace the view of teachers-as-technicians with the view of teachers-as-participant-researchers. The project attempted

to engage teachers as collaborative investigators of their own environmental education practice for the purposes of professional development. So the assumptions of this project were:

(i) that environmental education poses many teaching and curriculum issues for teachers and schools, and the exploration of these issues by participants is a key step if the environmental education movement is to maintain momentum.

(ii) that the exploration of these issues requires a form of classroom research that recognises teaching as complex and changeable, and engages teachers as responsible investigators of their own practice.

Structure

(i) Personnel

This school-based environmental education project began in mid-March, 1984 and involved two Deakin University staff members and one graduate student from the University of Michigan who together took on the roles of facilitators in the context of action research, along with seven primary school teachers from the Geelong area. The project was one part of a joint Deakin University / University of Michigan study which began in August 1983 during the author's sabbatical leave at the latter institution.

Whilst all seven teachers in the project had a three

year teacher-training qualification and were engaged in further study, their length of teaching service was extensive, ranging from five to fifteen years (average 7.4 years). For five of these participants, experience had been with a variety of primary school grades, and for the other two mainly with primary as well as minimal secondary teaching. Prior experience in teaching any type of environmental education was described by these participants as ranging from nil to minimal, with most declaring an emphasis on nature study/environmental science content. All participants in the project were volunteers.

(ii) Meetings

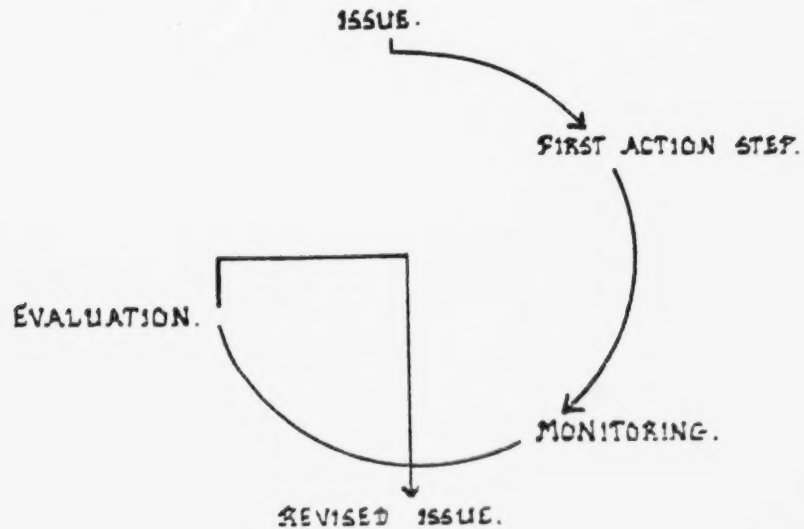
(a) School visits

For the duration of the project, and starting soon after an initial "group meeting", the facilitators, working either as individuals or pairs, visited the practitioners in their school settings. Each practitioner was visited between five and eight times, with the nature of the visits varying from one-to-one discussions between practitioner and facilitator, to observations of teaching, to pupil interviews. These visits were monitored, usually with a tape recorder, and reports on each visit were written by the facilitator. These written reports were supplemented by reports prepared by the practitioner (Figure 3) which included an account of teaching by the practitioner concerned and post-teaching reflective comments. If approved by the practitioner, these reports

FIGURE 3

S.B.E.E. PROJECT

GROUP MEETING REPORT FORM



STATEMENT OF TEACHING ISSUE:

PLAN OF ACTION:

MONITORING TECHNIQUES:

EVALUATION/OUTCOMES OF REFLECTION:

ASSUMPTION/S GUIDING CHOICE OF ACTION:

were tabled at the next "group meeting".

(b) Group Meetings

Once every three weeks, the ten project participants met as a group. At these group meetings, each practitioner was given the opportunity to describe the environmental education activities s/he had engaged in over the past three weeks. Each participant would also cite one or more "teaching issues" that had come into focus during the period. "Teaching issues" were those issues or matters of concern that arose as practitioners attempted to improve their environmental education practice -- to change their teaching in ways seen to be consistent with environmental education. Time was spent at each meeting in group reflection on these issues, with attempts being made to collaborate in the suggestion of teaching strategies or activity ideas which might resolve some of the teaching issues. These strategies or activity ideas were then "tried out" by the teacher through whose practice the issues had initially arisen.

Action Research -- An Example

The view of action research adopted in the SBEE project was essentially the same as in the GSCG: in terms of its actual procedural steps, action research was again assumed to be characterised by recurrent cycles of three phases -- "planning", "action", and "reflection". While a glossary of environmental education terms considered by participants to be important was maintained, this did not attain the same status in the SBEE as the "common

language" of the GSCG. In the SBEE, the glossary, though explicit (it was updated, typed and tabled for each meeting), was constantly being revised and bore little resemblance to the "common language" of the GSCG. In light of the experiences of the GSCG, the SBEE placed an emphasis on self-monitoring and self-reflection.

Figure 4 provides an example of some of the action research engaged in by one of the group members. The teacher's initial teaching issue was a dissatisfaction with the scope that his questioning allowed for pupils themselves to ask searching questions of each other and of adult figures about environmental problems. The teacher's plan was to engage his pupils in a lesson in which a controversial environmental problem was debated -- that is, the environmental problem was to act as a "vehicle" for exploring the relationship between his own utterances and those of his pupils. The action phase of this first action research cycle was in fact a class discussion based on a newspaper article on Aboriginal land rights; the action (the class discussion) was monitored by taperecording the session.

When the teacher came to reflect on or evaluate the session, he found on listening to the tape that there were a number of pupils who were not participating, and that he was (in his view) being too directive in his management of the session. In the light of this reflection, the teacher now perceived his teaching issue as a matter of seeking to improve the participation of pupils through alteration of

FIGURE 4
S.B.E.E. PROJECT
Michael West 1984 (16)

Initial Teaching Issue

I am dissatisfied with the scope my questioning technique allows for children themselves to ask questions about an environmental issue.

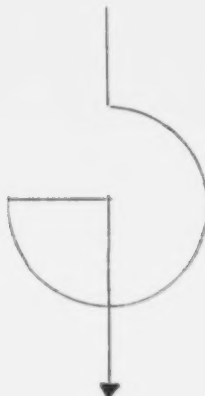
Reflection: several children are not responding. I am too directive. Try role-playing with smaller groups (Walmit)?



Action: hold class discussion on a newspaper article on Aboriginal land rights.

Monitoring: taperecord the session.

Revised Issue: will children become more participatory in small groups role-playing Walmit?

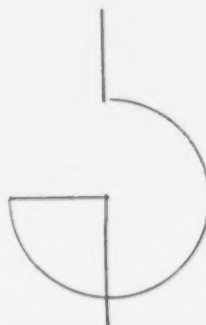


Reflection: children enjoyed the role-playing. Children questioned each others' statements to a greater extent. Able to use previous knowledge to a greater extent. Asked me not to interfere.

Action: conduct Walmit Divided "woodchip" scenario.

Monitoring - taperecord the session. Analyse a transcript of the discussion.

Revised Issue: Is my high-profile teacher's role getting in the way? Can children run their own sessions?



Reflection: disappointing result. Child-mayor unable to run session. Will ask children why.

Action: Try another Walmit scenario ("Bequest"). Have a pupil take on the role of mayor.

Monitoring: taperecord the session. Observe and take notes

Revised Issue: Can I occupy a management position without influencing the character of the debate?

the class' group dynamics. His plan in his second action research cycle was to engage the pupils in discussion of a controversial environmental problem in small groups. In the event, his action was involvement of the pupils in simulation game where they debated a hypothetical land-use issue(15). Again the action was monitored with a taperecorder, from which a transcript was prepared. In the reflection phase -- on reading the transcript and listening to the tape -- the teacher found that the children were questioning each others' statements to a greater extent and were drawing upon knowledge previously established by the other children to a greater extent. The children appeared to enjoy these small group interaction ad at times suggested to the teacher that is "presence was not required!"

The teacher's reaction to the outcomes of the second action research cycle was to consider whether his normally high-profile teacher's role was "getting in the way" of the (desired) development of children's ability to participate in discussions of environmental issues. As illustrated in the third cycle in Figure 4, the teacher explored this proposition by further changing his practice and reflecting on the outcomes.

The forms of monitoring engaged in by the teacher referred to in this example include:

- * taperecording (with subsequent transcripts);
- * observation (usually another teacher in the school, though occasionally a facilitator);

- * pupil interviews (by the facilitator);
- * teacher interviews (by the facilitator);
- * photography of class activities (by the teacher);
- * pupil workbooks;
- * teacher diaries.

The result was a rich source of varied information from a number of different sources, all of which was "fed back" into the teacher's decision making.

It should also be noted that the teacher had control over the analysis of information gained through these monitoring techniques. For example, the teacher initially simply tallied the number of teacher utterances and the number of pupil utterances in order to "get a feel for" the extent to which he dominated classroom discourse. Later, however, as he sharpened his perception of the relationship he was exploring, he developed a far more complex analysis sheet for distinguishing between his own utterances (in terms of the intellectual demand on students built into them) and between pupils' utterances (in terms of the factual and relational complexity of their questions and responses). An example of this analysis sheet and its application to a transcript of the teacher's work is presented in Figure 5. It is important to realise that the increasingly complex techniques of monitoring and analysis are indicators of the teacher's increasingly complex and powerful grasp and understanding of his own teaching. As the teacher's grasp of the complexity of his interactions with children improved, he

FIGURE 5: TEACHING OBSERVATION FORM

- C: If these teenagers clean it up, then we could cart it by truck for that little distance, to Honeypot Lane and dump it down. Since we had to clean it up to get it into the truck it would be nice and tidy and we could stuff it in a corner of the joint, and then we would have the rest of the corners for the other teenagers.
- C: But why don't they get people on night shift and day shift doing it?
- T: Why?
- C: Well for those on night shift it's a good idea, because they are getting more time into it.
- C: But then again, not many people come during the night.
- T: Who comes to the tip during the night?
- C: Saturday and Sunday is the main time. This is when we should employ them because a lot of people come to the tip, because people work all through the week.
- T: Would you like to work at the tip...?
- C: No I would not. You would get sick of the cars and the pollution.
- T: But this is a tip not the air. Where do you work, at the Supermarket, where does your rubbish go?
- C: All the rubbish ends up at the tip.
- T: Does it?
- C: Well, I'm a 60 year old pensioner and I can't be going around.
- C: But if it was a good wage you would get a lot of....
- C: Not nowadays,....
- C: (Discussion concerning employment of teenagers and their payment).
- T: Would anybody like to make any comments about it firstly? Right, we will start with you Joanne.
- C: I don't think they should have the bins. Take too long to fill, there would be disease.

TEACHER'S UTTERANCE							CHILD'S UTTERANCE						
Statement				Question			Name	Statement					Question
con	clar	fact	q&a	m&c	a&a	s&e		pre	uni	multi	rel	ext	y/n
											✓		
					✓								✓
											✓		
											✓		
					✓								
						✓						✓	
								✓					
	✓				✓			✓					
					✓								
											✓		
											✓		
												✓	
✓								✓					

gained greater control over his own personal development and accordingly his professional work became more and more rational. (The term "rational" is used here to qualify educational decision-making that is grounded in a personal understanding of the implications of personal practice).

This "close-up" example of action research may appear to some to be concerned with a fairly trivial matter. However the dissatisfaction cited as the initial "teaching issue" relates strongly to the teacher's conception of environmental education and had to be resolved (on the teacher's view) if his environmental education practice and the school's environmental education program were to improve. It was the view of this teacher, and of other participants in the SBEE, that the resolution of these kinds of teaching issues is crucial to improved environmental education, and further that their resolution ought to be a matter of self-initiated change based on raised consciousness about the relationship between personal teaching practice and personal conceptions of environmental education -- and not simply in response to some edict emanating from a central (that is, outside the classroom) administration.

Issues Arising -- Some Examples

(a) Some Curriculum Issues

A number of curriculum issues (that is, about environmental education) arose during the course of the

project operations and were the subject of extended debate. Some of these were:

(i) The role of teacher directiveness in environmental education

Many of the participants found that their prior classroom organisation had centred around a notion of the teacher as an authority figure and source of knowledge for students within their grade. For the most part, the flow of knowledge was a one-way pathway from teacher to student. Those teachers who wished to engage in a fair trial of an issues-based, child-oriented form of environmental education in their classroom realised that a potentially significant change would be required on the part of both the teacher, as a traditional source of knowledge, and equally on the part of students as the traditional recipient of knowledge.

The example outlined earlier where the teacher was concerned about the relationship between his own and his pupils' utterances, in the light of a perceived need to improve pupils' public questioning abilities, was one of several experiences that were brought to bear on this issue. The teacher perceived a contradiction between his notions of what really ought to occur for environmental education to take place (participatory learning), and his past experience (a more authoritarian approach as revealed by transcript analysis of his own teaching), and put this issue under scrutiny in his own practice. He explored how

the notion of "neutral chairmanship" might be expressed in his classroom.

(ii) The Relationship of Knowledge and Action in Environmental Education

Environmental education comes with a prescription for active participation in environmental issues. Do teachers and pupils need to have a systematic knowledge "bank" before becoming involved in environmental issues?

Two distinct view points exist concerning the necessity for teachers to possess a strong environmental knowledge and training. One view is that prior environment-related knowledge is a pre-requisite for teachers to have confidence to manage future investigations of an environmental issue and potential future action. This orientation gives firm support to the existence of traditional knowledge-based teacher training, and also to a hierarchy in which the teacher is seen as an authority-in-knowledge. This thinking leaves the locus of classroom control with the teacher, and runs contrary to the democratic notions of a program aimed at socially-critical education. The second viewpoint supports the notion that prior knowledge of subject matter is of less concern in the pursuit of an issue-based environmental investigation. This alternative view is one in which the locus of control shifts away from the teacher as a figure of authority-on-knowledge, to a facilitatory position within a democratic setting for an environmental

issue investigation. This view is that authentic knowledge about an environmental issue and its physical site will develop for teachers and pupils alike through joint investigation of that issue.

Similarly, for pupils, it is "conventional wisdom" that a previous thorough understanding of basic ecological principles, for example, improves the sensitivity of pupils to potential environmental problems. On the other hand, the perceived need for pupils to have a conceptual base prior to an issues investigation may lead the teacher once again to control the flow of knowledge in the classroom, thereby interfering with development of pupils' autonomy and responsibility in critiquing an environmental issue. Depending on the issue chosen, it could be argued that the acquisition of conceptual knowledge on the part of students can be gained within the context of an issues investigation as decided (democratically) by teacher and pupils during the course of the work.

(iii) Availability of "Real-Life", Current Issues of Investigation

A number of the teachers attempting to initiate and sustain an environmental education program based on the investigations of a series of environmental issues encountered problems in locating sufficient "real-life", current issues to drive such a program. Some perspectives advanced by participants on this issue were:

* environmental issues of interest to children

are rare, perhaps too rare to keep an environmental education program going at an acceptable rate. Environmental issues are moments in history and children's interest in them cannot be artificially created.

* it may well be that children of this age will have problems identifying local issues, or that no suitable issue may arise in a particular area at a given time. With these problems in mind, we believe it may be best if the teacher selects issues for the children...

* it might be better to work through an appropriate number of hypothetical and role play situations until such time as the students have developed the necessary skill and knowledge in order to tackle a real-life issue.

The ensuing debate around these issues clarified a possible contradiction. In the light of perceived shortages of local environmental issues of interest to the pupils, it seems reasonable to try to sustain an issues-orientation by imposing a "choice" of issues for investigation, or to develop skills of argument and debate by involving pupils in a simulated issue such as those in the simulation game Walmit Divided (17). However, to do the former of these things is to place the locus of control with the teacher and to undermine the independence, responsibility and perhaps motivation of pupils, with deleterious effects on the development of a socially-critical perspective on the part of the pupils. To rely upon a simulation game as a means of involvement in environmental issues is to provide the pupils with a false sense of control over environmental issues (since their power in negotiations is a function of some contrived or imagined and hence manipulable set of circumstances, rather than irrevocably grounded in "harsh reality"), and to fail to provide them with opportunities

to develop their own understandings about their "real" physical and social environment.

(b) Some Methodological Issues

Examples of some of the methodological issues (that is, to do with action research) to arise in this project were :

(i) The Explicating Effect of Action Research

Action research focuses on dissatisfactions in personal practice. It seeks to improve teaching practice by systematically trying out alternative strategies in a search for more satisfactory practice. Aspects of personal teaching practice (for example: questioning technique; class management) with which the teacher is dissatisfied are regarded as "teaching issues" to be researched -- they are "issues" in the sense that while dissatisfaction exists, the nature of improved practice is uncertain. Teaching practice is problematic.

It became clear in this project that a consideration of dissatisfactions in environmental education cannot be made in the absence of a consideration of a perspective on what environmental education "ought to be" (in particular), and more generally what education "ought to be". For example, a teacher's dissatisfaction with the extent to which his/her teaching encourages or allows pupils to ask searching questions of adults about controversial

environmental issues makes best sense when viewed against that teacher's conception of environmental education as a form of socially-critical education, in which pupils engage in a search for the values underpinning certain environmental actions. Another teacher with a strong "nature studies" conception of environmental education would probably not share a dissatisfaction with the same classroom climate.

In general, one's dissatisfactions with teaching or education are a function of one's assumptions (implied or explicit) about desirable teaching and education. Action research, in exploring such dissatisfactions, explicates these assumptions and thereby improves the rationality of personal professional development.

(iii) Facilitation -- the Issue of the Locus of Control

Clearly, since action research is research into one's own practice, only practitioners and groups of practitioners can carry out action research. However, "facilitators" are often involved and, in this project, three facilitators were involved in the following activities:

- * providing an initial "model" of curriculum design for environmental education;
- * providing an initial pool of activity ideas for environmental education;
- * organising meetings of participants;

- * providing monitoring assistance (audio-cassette recorders/transcripts);
- * providing emotional and intellectual support to other participants.

Equally clearly, given the aspiration in action research to posit the locus of control over the research with practitioners, the role of facilitators is crucial to the type of action research undertaken. The role of the facilitator needs to be regarded as problematic, and carefully thought through.

For example, the very acts (supportive though their intentions may be) of providing an initial model of curriculum design and pool of activity ideas, may themselves be pre-emptive. These acts may forestall attempts by practitioners to "put up front" their own prior perspectives on curriculum design. They may impose the facilitators' views of environmental education -- as manifested concretely in the materials provided -- upon practitioners. These acts may, from the outset, begin to create dependence of practitioners upon facilitators, which interferes with the attainment of "symmetrical communications" so important to the notion of a "critical community".

On the other hand, the facilitator is a member of the critical community, and ought therefore to have a role to play in contributing to and perhaps sharpening debate about what counts as improved practice, and in ensuring

that the debate is research-based (that participants are "tabling" examples of personal practice for critical reflection). The point is that the influential role of the facilitator in the politics of action research -- in particular, in affecting the locus of control -- needs to be recognised.

(iii) The Teacher as an Extended Professional

Perhaps the dominant view of teachers' professionalism is one of technical competence. The teacher is seen as being responsible for the competent implementation of "proven effective" curriculum materials in their settings. Their role is the instrumental one of effectively adopting the curricular products of the research of others.

This view of teachers as possessing technical competence supports an equally technical notion of educational research. In such a view, an "outside expert" researcher possesses expertise in experimental design and statistical analysis which is applied in instrumentally determining the extent to which a program (sequence of environmental education activities) achieves fidelity of outcomes and goals. The goals themselves, and the value judgements on which they are based, are beyond scrutiny. The role of the practitioners in such research is reduced to the technical one of carrying out as effectively and efficiently as possible the "treatment" phase of the research -- that is, the teaching of the program's activities.

A different view of professional expertise informed this Project. For example, it was assumed that practitioners would reflect critically on the endgoals of their programs, that they would be responsible for design decisions, and for data collection, and it was recognised that institutional structures can and do impose educational and social values on the work of practitioners. Put simply, the key notions of this Project were "teachers as researchers", and "critical community". Professional competence, then, was seen as requiring a capacity for deliberation not only about the relationship between educational goals, and educational practices, but also about the relationship between goals and practices on the one hand, and the institutional structures within which they have meaning on the other.

In the event, participants in this Project enacted their professionalism in the following ways:

- * by developing new interpretations on environmental education;
- * by developing greater understandings of the opportunities for and limitations to the improvement of environmental education in their respective schools;
- * by evaluating a range of environmental education curriculum materials;
- * by developing new insights into their personal teaching practice;
- * by developing a sense of control over their own

professional development through collaborative action research.

5.3 Summary

This Chapter has provided examples of local school initiatives in environmental education -- one at primary (elementary) level and one at secondary level. In both examples, practitioners were interested in exploring an issues-based form of environmental education, in which pupils are encouraged to investigate local, current environmental issues. In both examples, there was also an interest in action research methodology, with the development of a "common language" being a prominent feature of one study, and the improvement of self-monitoring and self-reflection being the focus of the other. A range of substantive (environmental education-related) and methodological (action research-related) issues were discussed in each study.

SUMMARY

This Part of the thesis has provided a range of examples of environmental education. These examples have included a brief account of the UNESCO-UNEP program in environmental education, an account of the environmental education activities of Australia's Curriculum Development Centre, and two accounts of the environmental education initiatives of individual schools. This Part, then,

provides an archival data-base of examples of environmental education drawn from international, national, and local levels from which the theses introduced in Chapter 1 can be explored through the "framework of critique" developed in Chapter 2.

NOTES

1. Brown, L. et al. Action Research: Notes on the National Seminar. Paper presented as part of an action research symposium at the 11th Annual Meeting of the South Pacific Association for Teacher Education, Adelaide, 22-26 July, 1981.
2. Kemmis, S. "Barriers to Change in Teaching: Some Implications for Inservice Education". Geelong: Deakin University (mimeograph), 1980.
3. Extracted from Fensham, P. A Report on the Belgrade Conference on Environmental Education. Canberra: Curriculum Development Centre, 1976.
4. Extracted from Jeske, W. Toward an Action Plan: a report on the intergovernmental conferences on environmental education. Washington, D.C.: U. S. Department of Health, Education and Welfare Office of the Assistant Secretary for Education, 1978.
5. Extracted from C.D.C's Environmental Education Project. Canberra: Curriculum Development Centre, 1980-1981.
6. Lucas, A. "Science and Environmental Education: Pious Hopes, Self Praise and Disciplinary Chauvinism". Bedford Park, S.A.: The Flinders University (mimeograph), 1980.
7. Fensham, P. and May, J. "Servant not Master -- A New Role for Science in the Core of Environmental Education". Australian Science Teachers Journal 25(2): 15-24, 1979.
8. Brown, L. et al (op. cit -- see note 1).
9. Brown, L. et. al (op. cit -- see note 1).
10. Kemmis, S. (op. cit -- see note 2).
11. Henry, J. "'Cracking open the Nut': The Articulation of Curriculum Concerns and Possible Solutions Through the Development of a Common Language". Paper presented as part of an action research symposium at the 11th Annual Meeting of the South Pacific Association for Teacher Education, Adelaide, 22-26 July, 1981.
12. Grundy, S. and Kemmis, S. "Social Theory, Group Dynamics and Action Research". Paper presented as part of an action research symposium at the 11th Annual Meeting of the South Pacific Association for Teacher Education, Adelaide, 22-26 July, 1981.
13. This paper is a version of a Report on the School-based Environmental Education Project prepared by Ian Robottom, Neil Markowitz and Maureen Wright at Deakin University and presented at the 13th Annual Conference of the North American Association for Environmental Education: International Perspectives on Environmental Education: Issues and Actions. Banff, Canada: 5-9 October, 1984. The research reported here was supported by grants

from Deakin University and the University of Michigan.

14. See for example Strickland, M.; Robertson, E.; Jettinghoff, C.; and Diener, C. "Pretest and Posttest Comparisons of Preschool Children's Knowledge about Energy". Journal of Environmental Education 15(2): 32-35.

15. The teacher used an environmental education simulation game: C.D.C. (1980), Walmit Divided, Canberra: Curriculum Development Centre.

16. An extract from a report prepared by Michael West of Diggers Road Primary School (Victoria: Australia) for the School-based Environmental Education Project.

17. C.D.C. (op. cit.-- see note 15).

PART III: CONTESTATION IN ENVIRONMENTAL EDUCATION

PREAMBLE

Part I of this thesis was concerned with developing a "framework for critique" from a range of perspectives in science, innovation, educational research and evaluation, and education. In Part II, an account was provided of developments in environmental education at the international, national and local levels. The intention in this Part is to apply the framework developed in Part I in a critique of the environmental education movement as represented in the studies reported in Part II.

It is clear that the perspectives of Part I and Part II do not represent, in any sense, an account of "objective reality". They are interpretive constructions of aspects of education and environmental education respectively. Part II, especially, is a highly selective history of the environmental education movement and an account of several particular environmental education projects. However, the environmental education movement is a social organisation comprising a number of interacting forces and interests. This Part will describe how different perspectives in science, innovation, educational research and evaluation, and education have informed the forces and interests which shape the environmental education movement.

A rationale for engaging in a search for the various justifications of actions in environmental education can

be found in the comments of Buzzatti-Traverso, who was Senior Scientific Advisor to UNEP and key figure in the UNESCO/UNEP Programme in Environmental Education. In this capacity, and addressing UNESCO's Belgrade Conference on the topic of "the philosophy of environmental education", Buzzatti-Traverso spoke of the importance for environmental education of recognising the multiplicity and roles of "social values" and "competing ideologies" in education(1):

At any one time, the educational system -- whether based on religious dogmas and practices or on rational thought -- has tried to divulge, sustain and perpetuate sets of social values. The process has occurred sometimes openly, at other times through devious channels. If you consider the world today and examine the diverse educational systems, you can clearly identify competing ideologies: those which are attempting to hold on to recognised and almost undisputed values, and those which have launched a major strategy for conquering the world and men's minds.

In other terms, behind any educational process lies a philosophy, a moral philosophy, for the people who exert power and are in charge of educational institutions share certain values, which they wish to disseminate in order to ensure the prolongation, if not the indefinite survival, of the system they are devoted to.

In this view, any educational system or programme finds its justification in a certain philosophy of values...

In a discussion about contestation in the Victorian Transition Program, Kemmis et al invoke the notion of "contestation" to describe the phenomenon of conflicting perspectives and competing ideologies in a social organisation:

Contestation is the process by which these forces (present in all social organisations) are created, realigned or displaced. Contestation is not a problem obstructing the otherwise straightforward process of implementing

organisational change. Charming though such a view may be, it misses the essential nature of the process of change in general and of institutional reform in particular. Any initiatives which propose the modification of the status quo imply the existence of conflicting points of view. Current practice, and the ideas which underpin it, will naturally have its advocates, as well as its critics. Furthermore, there will also be conflicting points of view among those who seek to initiate change, both over the nature of the changes sought and the procedures and strategies appropriate to their promotion. Contestation is the quite normal and fundamental process by which these conflicting points of view are worked through(2).

Kemmis et al also outline three media of educational reform at which contestation occurs:

(i) The level of language. This is the level of ideas, debate, and legitimation. It is possible, through examination of the discourse of such a movement as the environmental education movement, to discern contestation about "the terms in which the program is described, interpreted and appreciated"; and debate about the "intent of the program, the appropriateness of the strategies it supports, the nature and meaning of outcomes and the appropriateness of criteria to apply in success".

(ii) The level of organisation. This is the level concerned with the "disposition of power" and "changes in authority structures". Contestation here involves the "distribution of material resources and the processes of decision-making".

(iii) The level of practice. This is the level of productive action, or "what happens in the material world".

These three media are interrelated as follows. Through

examination of the language or discourse of a program or movement (such as environmental education), one can identify the justifications -- the values, beliefs and assumptions -- that guide actions of various types. The language of a program will reveal the sources of legitimation of organisational strategies and structures and educational practices. Organisational strategies and structures control communication (for example, they institutionalise certain hierarchies of decision-making) and hence determine certain social relationships, and they shape and constrain educational practices by framing what is regarded as "possible" in a particular context. And practice is the concrete expression in work and life of the ideas discernible in discourse and social relationships discernible in organisational strategies and structures.

It is assumed that people wish, and ought, to adopt a coherent view of science, innovation, research and education -- a common epistemological position. But in the field, coherence is often lacking. Indeed we find examples of non-correspondence, inconsistencies, incompatibilities and *contradictions* . This Part of the thesis will look for evidence of contestation occurring in the arena of the environmental education movement at the levels of language, organisation, and practice. Examples of contestation between perspectives on science, innovation, educational research and evaluation, and education will be identified according to the framework developed in Part I. Thus, this Part is, in a sense, a "test" of the

applicability of the notion of contestation.

The overall proposition being advanced in this Part is that the environmental education movement is characterised by a process of contestation, in which these different perspectives, forces and interests "contest the ground" in a struggle for legitimacy and superiority within the territory claimed for itself by the environmental education movement.

NOTES

1. Buzzatti-Traverso, A. "Some thoughts on the philosophy of environmental education". In UNESCO, Trends in Environmental Education. Paris:UNESCO, 1977.

2. Kemmis, S.; Dawkins, D.; Brown, L.; Cramer, B.; Reilly, T. Transition and Reform in the Victorian Transition Education Program. Melbourne: TEAC, 1983.

CHAPTER 6: CONTESTATION AT THE LEVEL OF LANGUAGE:
ASPIRATION AND DOGMA IN THE LANGUAGE OF ENVIRONMENTAL
EDUCATION

6.1 An International Language for Environmental Education

In Chapter 3, it was argued that the conferences at Stockholm in 1972, Belgrade in 1975, and Tbilisi in 1977 represent landmarks in international activities in environmental education. Of these, the Belgrade and Tbilisi conferences produced notable statements of aims and guiding principles for environmental education -- statements which came to be accepted by many as an internationally endorsed language of environmental education.

At the Belgrade conference, in a commissioned trend paper entitled "The nature and philosophy of environmental education: goals and objectives", Schmeider observed that there was "little consensus as to what the domain of environmental education is, what an educator should know and do, and even more basic, how humanity can best cope with the complex and ever-changing environment in which it now finds itself"(1). However Schmeider was able then (in 1975) to identify one common element:

inherent in all environmental education...is the philosophic belief that we must seek nothing less than a basic reform in the way our society looks at problems and makes decisions. While this is a responsibility of society at large, educational systems could have a key role to play in this reform.

Two points which emerge from this statement are an orientation towards environmental problems (how decisions about such problems are taken in society) and the notion of environmental education as a reform. The emphasis on decision-making reflects a similar emphasis in an earlier, influential definition of environmental education developed by the IUCN(2):

Environmental education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality.

The Political Character of Environmental Education

Another definition of environmental education cited by Schmeider qualifies the "problem-solving" characteristic of environmental education -- it suggests that environmental education deals with problems that are not simply technical matters susceptible to resolution through the application of conventional scientific problem-solving strategies, but that such problems are at least in part political:

Environmental education involves teaching about the value judgements and the ability to think clearly about complex problems -- about the environment, which are as political, economical, and philosophical as they are technical(3).

This definition was developed by the Organisation of American States in 1971. At the 1975 Belgrade conference, advocacy of the political character of environmental

education was continued by the Latin Americans. For example, their contribution to development of the Belgrade Charter contains a clear prescription for politicisation of environmental education. Their written submission stated, in part:

The growing and, at times, unrestrained consumption pressure by certain sections of humanity with regard to the earth's resources, their irrational exploitation and the establishment of inequitable norms in their international marketing, lead gradually to an irreversible crisis and bars the possibility of a just life to millions of human beings. There must, therefore, be a radical change that will make it possible to achieve new styles of development, whose goal will be the proper utilisation and equitable distribution of each country's resources to satisfy, on a permanent basis, the needs of their inhabitants...The new approach required by humanity with regard to development and conservation of its environment also involves a change in the order of priorities established generally by a few groups at the world level. In this connection those policies aimed at the exclusive maximisation of output, without regard for its consequences on society and on the resources available for improving the quality of human life, must be opposed(4).

These comments are included here for two purposes. First, to establish that in the early days of international discourse about environmental education, there was a concern that environmental education be seen as being substantively political and, secondly, to illustrate how interested parties sought to employ the conference sessions to protect their interests -- in this case, using debate about "the environmental situation" as a forum for exposing the issue of perceived inequitable distribution of resources at an international level.

The proposition that environmental education is

substantively political was eventually embedded in the final form of the Belgrade Charter, which states in part:

Inequality between the poor and the rich among nations and within nations is growing and there is evidence of increasing deterioration of the physical environment in some forms on a world-wide scale. This condition, although primarily caused by a relatively small number of nations, affects all humanity. The recent United Nations Declaration for a New International Economic Order calls for a new concept of development -- one which takes into account the satisfaction of the needs and wants of every citizen of the earth, of the pluralism of societies and of the balance and harmony between humanity and the environment. What is being called for is the eradication of the basic causes of poverty, hunger, illiteracy, pollution, exploitation and domination. The previous pattern of dealing with these crucial problems on a fragmentary basis is no longer workable(5).

This statement is political because of its implications for distribution of resources; it also has a socially-critical element in that it prescribes an approach which recognises a series of inequalities in society and implies, with use of the terms "domination" and "exploitation", the existence in that society of a set of inequitable power relations which need to be redressed.

The final version of the Belgrade Charter is included in a report written by an Australian representative at the conference, Professor Peter Fensham(6). It is surprising that such a well-considered document was not tabled at the next intergovernmental conference organised by UNESCO, at Tbilisi (USSR: 1977). Perhaps its political implications were deemed inappropriate for a gathering of government representatives from all United National members(7). In the event, fresh attempts were made to "refine and define

what constitutes environmental education", with concern being expressed "that the term was now being used so widely that it could cover almost all aspects of education done well"(8). The final outcome was termed the "Tbilisi Declaration"; the statements of goals, objectives and guiding principles developed at Tbilisi are represented as Appendix 1.

Belgrade and Tbilisi -- a similar aspiration.

A comparison of the statements of goals, objectives and guiding principles of Belgrade with those of Tbilisi shows a number of similarities. According to the Belgrade Conference, the goal of environmental education is

To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.

The elements of this goal statement are (i) improved awareness/knowledge about the environment (a cognitive component); (ii) an attitude of concern about the environment (an affective component); and (iii) a problem solving orientation (an action component involving collective as well as individual work). The first two elements figure in the Tbilisi goal statements ("to foster awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas") and while the problem-solving orientation is not present in Tbilisi's goal statements, it is strongly prescribed in other statements from that conference. The

degree of similarity between the environmental education objectives and guiding principles is even more marked: for all intents and purposes the two sets of statements are isomorphic, with the three elements contained in the Belgrade goal statement being clearly expressed. Both conferences stress the objectives of developing awareness and knowledge about the environment, and of the acquisition of "feelings of concern for the environment". Both also place a significant emphasis on problem-solving: "to help individuals and social groups acquire the skills for solving environmental problems"; "to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems".

"Problem-solving": a key characteristic of environmental education.

The high status ascribed to a "problem-solving" orientation in international deliberations about environmental education is confirmed in a post-Tbilisi UNESCO publication(9): "the most important characteristic of environmental education is probably its approach to specific problem-solving". The same publication explicates this key component of environmental education:

the aim of environmental education is not to dispense odd bits of information on the environment or to achieve a number of methodological goals unrelated to reality. Environmental education involves essentially teaching through action. Knowledge, attitudes and skills assume their full significance in contact with the problems of the environment, giving the persons concerned an opportunity of taking part in the social decisions which affect their setting(10).

In internationally-accepted statements about environmental education, then, the focus in the problem-solving approach is not directly upon the environment per se, but on environmental issues (that is, environmental problems over which social opinion is divided and a decision required). The intention is not primarily the provision of information about the environment; the intention is enhanced understanding of the processes of environmental problem-solving -- the means by which the environment is exploited, the manner in which decisions about the future of aspects of the environment are taken, the respective justifications of competing proposals, and the means by which decisions may be influenced.

Peter Fensham, an Australian representative at both the Belgrade and Tbilisi conferences, reports(11) that at Tbilisi there was international recognition given to three distinguishable sorts of education:

1. education in the environment;
2. education about the environment;
3. education for the environment.

These three types of environmental education are cited frequently in the literature, and are explicated by Lucas(12) and Greenall(13). In education about the environment, the focus is upon development of a greater understanding of the environment itself -- of its biotic and abiotic components, their interrelationships, and the skills for investigating these components and interrelationships. Education about the environment is

concerned with increasing environmental awareness through fairly explicit, formal studies. The emphasis is on provision of facts, concepts and theories about the environment, and on the exercising of such intellectual and technical skills as observation, measurement, classification and so on. Education about the environment frequently takes place within the structure of conventional subject areas like science and geography.

Education in the environment is more problematic. It has been described(14) as the pedagogical technique of using the environment as a context for otherwise conventional studies, including the exercising of investigative skills as in nature studies. Increased awareness of aspects of the environment can be expected through provision of opportunities for direct contact with the environment. On this view, the difference between this dimension and education about the environment seems to reside in the extent to which information and activities are organised and explicitly treated in ways determined by the teacher, and the main environmental education-related justification of both education in and about the environment is improved knowledge about the environment. The assumption underlying this justification is a technicist one -- that "a certain amount" of knowledge is necessary before an individual can sensibly participate in the action of investigating environmental issues (that is, in environmental problem-solving).

However, it is possible that certain forms of education

in the environment -- for example Steve Van Matre's "acclimatisation" activities -- are justified differently. For Van Matre, the conscious action to teach out-of-doors is taken because it is only in natural settings that pupils can, as individuals, develop a sense of close rapport and empathy with the environment. This empathy has more to do with the development of an appreciation of the environment as a personal value, rather than as preparation for later environmental action of some sort. Addressing himself to an audience of the American Camping Association, Van Matre writes(15):

We cannot permeate our program with sermonettes. We must first convey appreciations and feelings for the natural world -- our message of concern must be subtle and well-timed. But how can we convey such a deep and abiding love if we transform our programs into forums of fear? All the pollution statistics ever conjured up will not stir the soul of one energetic lad...

There is an alternative. Forget for the moment the time honored methods which have fallen just short of being disastrous. Forget if you can the usual intention of attaching labels or providing sizeable facilities which merely duplicates the school. Forget all the foibles of our so called modern education. Instead let's break the mold. Let's stop trying to perpetuate a senseless accounting of objects -- an endless parade of terms. Let's help our campers acclimate themselves to their own environment. To understand it on their own terms, and its own merits. Let's take a leaf from the current work in human relations and adapt it to our own situation. We call it acclimatization. Let's subject the camper to the most sensory experiences imaginable: mud baths, bog crawls, marsh wading -- and let's do at times blind-folded or ear-plugged -- with all of our senses in total operation: taste , smell, touch, sight and sound.

Let's sensitize the individual to his environment. What do we care if the camper fails to remember the name of a wildflower? Does he remember its fragrance, the texture of its leaves -- does he know where to find it, what lives in its community? And does he know, not because someone told him he should know, but because for him it is a thing of enjoyment and beauty?...

In short, the camper should come to "feel" his environment. To draw it close to him, to love it. To understand it -- not for its labels and fables and fears -- but as an intrinsic part of himself. Let's go at it with the idea that if we take care of our natural heritage now, then we'll have an American heritage later.

Unlike education in and about the environment, education for the environment aims to assist more actively the preservation of the environment, to inculcate attitudes of concern for the features of the environment that enhance the quality of life or which are deemed to possess intrinsic value, and to create a predisposition towards committed action that is consistent with those attitudes(16). Education for the environment, unlike education in and about the environment, is concerned with investigating environmental issues with a view to mounting a critique of the value-laden decisions taken as part of attempts at resolving these issues.

The differences between education for the environment on the one hand and education in and about the environment on the other are exactly the same as those suggested as existing between a "problem-solving" orientation and a "knowledge/awareness" orientation. Rather than aiming at providing technical information about the environment and opportunities for students to exercise skills in gaining such information, or for students to "acclimatise" themselves in the environment, education for the environment entails the use of environmental issues as vehicles for informing individuals about the forces at work in instances of environmental exploitation. The assumption is that individuals are best informed by a

process of participation in the action of problem-solving, in which knowledge and skills are developed in the course of investigating, forming an individual opinion about and formulating and executing an action plan in respect of, an environmental issue. "Education for the environment" seeks to understand -- to make explicit -- the value structures upon which certain causes of and solutions to environmental problems are based; and it seeks to develop these understandings by a process of working through alternative plans of action. The action component of "education for the environment" is apparent in Fensham's own characteristic of this type of environmental education(17):

- (i) EE is oriented towards a problem;
- (ii) EE is concerned with realistic situations;
- (iii) EE aims to elaborate the alternatives that exist for situations and the skill of choosing between them;
- (iv) EE includes action as an integral component;
- (v) EE uses the real environment for the school and its surroundings as a context;
- (iv) EE involves the clarification of values;
- (vii) EE aims to manifestly increase the mastery students have over their environment.

So the meaning of "problem-solving" conveyed in the discourse of Belgrade and Tbilisi is different to the conventional one. The conventional meaning of "problem-solving" suggests the application of technological/instrumental methods in the positive solution of technical problems. The statements from

Belgrade and Tbilisi suggest that "problem-solving" entails active participation in the processes of social decision-making about environmental issues. This view of "problem-solving" recognises that environmental problems are ultimately and inevitably political matters, and that their "solution" entails an explication of contending values. The latter is the only interpretation of "problem-solving" consistent with the guiding principle that "environmental education should consider the environment in its totality -- natural and built, technological and social (economic, political, technological, cultural-historical, moral, aesthetic)(18), and consistent with the social-political concerns of the community about the environment -- concerns to which, after all, the UNESCO program was a response. Given the origins of the movement, and on this interpretation of "problem-solving", "education for the environment" would appear to be the only defensible form of environmental education.

It has been claimed in the foregoing that the "official", endorsed statements about environmental education emanating from Belgrade and Tbilisi support a problem-solving orientation which politicises environmental education in a way consistent with the nature of the environmental concerns to which environmental education is actually a response. This is not to say that the language of environmental education ought to be seen as being in some way logically "pure" or completely internally consistent or an indication of utter

unanimity -- or further, that by virtue of these qualities, the language ought to be regarded as persuasive and compelling general assent.

The claim that the international position on environmental education favors a politicised, problem-solving orientation is based mainly on the stipulative meanings of statements emanating from conscious deliberations about the meanings of terms -- about the meanings of goals, objectives and guiding principles in this case. However, the literature considered in Part I and Part II of this thesis reports more than these conscious deliberations; there are also accounts of discourse about strategies and organisation of the environmental education movement. In these accounts there are embedded, unconscious, interpretive meanings. Put simply, as individuals engage in discourse about environmental education strategies or organisation, they unselfconsciously express views -- underpinned by particular assumptions -- of environmental education itself. In the case of the environmental education movement, it is clear from a consideration of interpretive meanings that these views and the language appropriate for describing them are contested, not consensual.

For example, there is a tension, even, in the proposition that environmental education is an amalgam of education in, about, and for the environment. This proposition implies some minimal degree of compatibility between the three. However to advocate education about the

environment is to support the provision of systematic knowledge as a main aim: the justification for such a form of education is usually that some types of knowledge are inherently worthwhile in some objective sense, and their systematic treatment is a necessary precursor to informed action. This objectivist view of knowledge underpinning education about the environment is logically inconsistent with the knowledge/action dialectic embedded in education for the environment. (In the words of UNESCO, "environmental education involves essentially teaching through action").

Instances of contestation may be found in written accounts of discourse at Belgrade and Tbilisi. For example, while much of the discourse at Belgrade stressed the "interrelated", "integrated" and "holistic" nature of the "new global ethic" being sought, several contributions were clearly grounded in a conflicting paradigm. Bennett's(19) model for evaluation of environmental education, proffered in a commissioned "trend paper", was reductionist and analytic rather than integrated and holistic. Commenting on Bennett's paper, Fensham recalls(20)

Environmental Education was described on a number of occasions as requiring an essentially "holistic" rather than an "atomistic" approach. While the jargon "holistic" proved a very confusing word for many participants, there is a lesson for evaluation in what its users are trying to imply about Environmental Education. Models of evaluation that are synthetic and interactive rather than analytic are urgently needed since they seem likely to be logically contingent with, and hence not to distort, many types of Environmental Education programs.

Bennett himself appeared to recognise the appropriateness of non-reductionist approaches to environmental education, though at the same time apparently wishing to preserve an each-way bet. In a written submission for consideration as part of the Belgrade Charter, he endorsed the statement...

whereas the reductionist approach will continue to yield useful results in the analytical phase of research, a holistic attitude should prevail -- that is, an attitude which views man and the innumerable components of this physical and cultural environment as a single whole(21).

Bennett, then, wished to prescribe an overall attitude for environmental education -- a "quantum leap in thinking...necessary for the formulation of new global principles" -- which is "holistic", integrative and synthetic, and simultaneously to advocate a form of research that is applied-science and reductionist in character, and hence antithetical to the prescribed overall attitude.

Another example of contestation can be found in UNESCO publications associated with the Tbilisi conference. In a document entitled "Education and the Challenge of Environmental Problems", the point is made that the goals of environmental education are socially and culturally embedded:

the ultimate aims of education -- and particularly those of environmental education -- cannot be defined without taking into account each society's actual economic, social and ecological circumstances and the objectives established by that society for its development"(22).

The document goes on to say that "the achievement of such

ultimate aims presupposes that education will disseminate knowledge, values, skills and attitudes such as will foster understandings of environmental problems and their solution". Here the authors are establishing the context-dependent nature of the goals of environmental education, then within a few paragraphs, presupposing the generalisability (that is, context-independence) of knowledge, values, skills and attitudes intended to achieve those goals. This is an example of a clash of epistemologies -- the one subjectivist, the other objectivist.

It could be argued that the validity of this example of contestation depends on an over-strict interpretation of "dissemination" as "the active translocation of ideas from one site to another", and that the authors actually meant something different. That this is not the case can be seen in the attention given at Tbilisi to the matter of preparation and distribution of educational resource materials.

A clear example of contestation as "a struggle for right of ownership over a language" (for example, over the definition, aims, and guiding principles) in which environmental education is described took place in recent Editorials of the international Journal of Environmental Education. In a Guest Editorial in 1982, D.R.Nichols outlined the "parameters of outdoor education"(23). At the foot of page three of this Guest Editorial, the journal's incumbent editors drew the attention of readers to the

issue of defining environmental education with the comments, "EE is now well over a decade old. Can we define it as well? Do we need to?" These questions drew a sharp response from Hungerford, Peyton and Wilke who, in a Guest Editorial carrying the title "Yes, EE Does Have Definition and Structure"(24) made the following comments:

Here were those same questions again -- years after they should have been laid to rest once and for all!

In an effort to bring increased order to the field and to operationalise the structure of environmental education, the writers developed and published a set of goals called "Goals for Curriculum Development in Environmental Education"...These goals were validated against the Tbilisi objectives. Further they were submitted to a jury of outstanding educators...Following modifications suggested by this distinguished jury, the goals were considered to be valid.

The premises on which the goals are based are sound. The components of the framework reflect the dialogue and trends of contemporary environmental education. The goals have proved to be functional in the development and analysis of curricula and as a model for research purposes... It is disconcerting (to say the least) for those involved in the implementation of EE goals to hear again the question: "What is EE?" It must be just as unsettling for those who are asked to fund or otherwise support our efforts to read that, after a decade, the professional journal of environmental education is still looking for an operational definition of the field.

We submit that environmental education does have a substantive structure that has evolved through the considerable efforts of many and that the framework has been documented formally in the literature. The question asked in The Journal of Environmental Education in the fall of 1982 most certainly has been answered. One would dare hope that this question could, at long last, be laid to rest. No doubt, it would behoove the environmental education community to keep a critical eye on its goals and to reassess them as necessary, but the field is quite definitely beyond the goal setting stage and into the business of goal implementation.

This Guest Editorial, in an influential international journal, provides an instance of members of "the academy"

seeking to protect a particular language of environmental education -- a set of "Goals for Curriculum Development in Environmental Education" written by themselves (25). The article is not a contribution to debate about definitions, aims and guiding principles; it is an attempt to foreclose such debate in a way which protects the interests of its authors. The authors' goals, it is claimed, "reflect the dialogue and trends of contemporary environmental education", yet in this article the authors are suppressing such dialogue, with more than a touch of petulance: "Here were those same questions again -- years after they should have been laid to rest once and for all!"; "One would dare hope that this question could, at long last, be laid to rest." These comments reveal a rationalist theory of action -- that definitional questions can be set aside, enabling us to "get on with the job".

The authors claim a certain status for their own goals by citing their validation by a panel of "outstanding educators" and the fact that they have been "formally documented in the literature". The goals are regarded as providing "a model for research purposes" and a framework for analysis. The impression conveyed by this is that the authors' goals can now be accepted (are, in fact, not to be questioned) as an objective, public form of knowledge which can be applied in guiding the research and other activities of the movement. The authors' rationale for their stance in this article is, in part, to present a united front to funding agencies.

The article, however, demonstrates contestation rather than unity. There is the obvious conflict between Hungerford, Peyton and Wilke's attempts on the one hand to foreclose debate about goals, and the attempt by the journal's editors to encourage this debate. There is also contestation evident in the claims advanced within the article itself. The authors' goals "were validated against the Tbilisi objectives". As we shall see, the Tbilisi statements advance a socially-critical perspective on environmental education -- one based on a post-empiricist conception of knowledge that recognises the interactions of knowledge and values. However, the authors' argument that their goals are a generally-applicable, objective, public form of knowledge (a "model for research purposes" that is now in some sense above debate) can only encourage an instrumental type of research based on an empiricist conception of knowledge that leaves the values embedded in goal statements beyond scrutiny: "the field is quite definitely beyond the goal setting stage and into the business of goal implementation".

Instances of contestation may also be found at the national level. For example, at the "First National Congress for Environmental Education Futures" held in Vermont (USA) in August 1983, a number of participants who "have actively experienced a wide variety of state-of-the-art practices in the field of environmental education" met to "identify and debate policy needed to guide the future of environmental education"(26). That is, this was a meeting of informed persons with the express purpose of engaging in debate about the terms in which

environmental education is to be described, and about the intentions and strategies of environmental education for the next several years. The Congress accepted as its goals, objectives, and guiding principles those developed by the UNESCO International Programme in Environmental Education at Tbilisi:

Environmental Education inservice programs should be developed which prepare teachers to implement instruction supporting the attainment of environmental education goals and objectives stated in the Tbilisi Declaration within the framework of existing instructional programs in all subject areas, and in keeping with the guiding principles of environmental education stated in the declaration (Recommendation 3, Burlington Congress).

Acceptance of the Tbilisi language amounts, as argued earlier, to acknowledgement that environmental education programs ought to be integrated and holistic; that because of the influences of particular economic, social and ecological circumstances, decision-making about environmental education programs needs to be seen as context-dependent; and that environmental education is politicised. In short, to accept the Tbilisi statements is to entertain a non-objectivist, post-empiricist view of knowledge. However much of the discourse at the Congress about appropriate responses to these statements was informed by a conflicting (objectivist) epistemology. Recommendation 4 of the Burlington Congress proposed to respond to Recommendation 3 above by mounting a dissemination system in which

Information for educators on environmental materials (printed, non-printed, and software) should be disseminated through intra-state centres. These centres should be capable of

collating, maintaining, and circulating information to the educational community. Local centres should also evaluate regionally-produced materials for inclusion in this system. This information should be developed by a central clearinghouse which would actively seek environmental materials produced by the public and private sectors. The clearinghouse would also coordinate the flow of information with the intra-state centres.

The diagram accompanying this recommendation showed this "flow of information" to be one-way.

In a document associated with and pursuant to the recommendations of the Burlington Congress, Barton(27) outlined a dissemination configuration for environmental education involving a national and several regional centres:

An ideal nationwide configuration would be for the National Environmental Education Center to serve as the hub, with several regional environmental education centers to be linked to it as satellites for delivering services to the groups of states. The regional centres would provide the first-line interface with the consumers of environmental education, both students and teachers in local schools, youth leaders, etc.

The characteristics of a "Research, Development, Diffusion, Adoption" (RDDA) perspective on educational innovation are alive and well in the above proposals: the educational context is seen as inevitable and fixed (inter-context differences are not an issue); the practitioner is seen as a philosophically-passive receiver of the innovation; and change is seen as an event achievable through a rational process of materials development and diffusion. As pointed out in Chapter 2 of this thesis, the RDDA perspective is informed by an

objectivist epistemology, one in direct conflict with the view of knowledge informing the stipulative statements from Tbilisi.

At the national level in Australia, there are also examples of acceptance of the language of Tbilisi by agencies active in environmental education. At the inaugural national conference of the Australian Association for Environmental Education, the then President (Professor Peter Fensham) drew the attention of conference participants to "education for the environment", and outlined the characteristics of that form of education(28). The Curriculum Development Centre, in its nationally-distributed Environmental Education Project materials, clearly adopts the language of Tbilisi. In a chapter entitled "An Introduction to Environmental Education", the Project Coordinator invokes the "in,about,for" trichotomy and aligns the Project's conception of environmental education squarely with "education for the environment":

We can talk about education in the environment, education about the environment, education for the environment, but only the last can be called environmental education...it is only when education for the environment is the intention that environmental education is actually taking place...Environmental education is more than just developing knowledge about the environment and skills to investigate the environment. Environmental education involves developing a concern for the environment, developing a willingness to take responsible action to improve the quality of life, and accepting responsibility for environmental management(29).

A later chapter in the same publication develops a "conceptual framework" for environmental education. The

authors declare their acceptance of the language of
Tbilisi:

As with other areas of educational endeavour the aims, objectives and guiding principles of environmental education have been distilled over many years. Those used here have been drawn from the recommendations of the Intergovernmental Conference on Environmental Education held in 1977 and have been adapted so that they apply specifically to the school level. They are included here not because they are immutable but because they provide an essential basis on which to build curricula in environmental education(30).

While the Project is unreserved in its advocacy of "education for the environment" and the Tbilisi prescriptions (and therefore of a politicised, problem-solving orientation) in the "theoretical" chapters ("Introduction"; "Conceptual Framework"), there are signs of contestation of the problem-solving orientation in other parts of the Project's materials. For example, Pearson's chapter on "Environmental Science, K-2"(31) is aligned with "education in and about the environment", as indicated by the following comments:

"My belief that it is not only possible, but that it is also effective, exciting, and efficient to teach out-of-doors, has led me to explore the use of the world beyond classrooms for science in Years K-12. I use the out-of-doors as a resource from which students garner facts through their senses...Children's sensory and scientific awareness can be extended through finding communities of plants on the soccer field...The resources for the course were all outside -- the shapes of leaves, the movements of shadows, the sizes of plants, the diameters of stems, the appearance of buds, the rotting of fruits and flowers, and so on. So it was a factual course. These facts could begin to form a basis for the later development of attitudes towards the out-of-doors and towards the environment as a whole".

The inclusion of this "environmental science" chapter in an environmental education publication -- one which espouses an "education for the environment" orientation -- brings to mind the debate concerning the role of science (and science teachers) in environmental education(32). The issue of the appropriateness of a natural science perspective in environmental education, whether expressed substantively as "education about the environment" or procedurally through the organisation of the movement, will be discussed at greater length later in this thesis.

At the local (school) level, there are further instances of contestation. When teachers come together to discuss the meaning of environmental education, notions of the political dimensions of environmental education contest with notions of environmental education as a type of science and as a type of outdoor education. As mentioned above, the term "environmental science" is used by some to defend a "nature study" orientation in an environmental education context, while others strive to ensure that political and economic meanings are considered in discussions about any activities bearing the descriptor "environmental". In the following transcript (an extract of a Geelong Secondary Cluster Group meeting -- see Chapter 5.1), the terms "environmental education", "environmental science", and "environmental studies" are discussed. In relation to the term "environmental science", some contestation is clear: for Syd, the inclusion of "science" in "environmental science" confers a technical, scientific, management character to

activities carrying that descriptor; for Rosa, all environmental matters are inherently political.

Ian: How about we look at the first step to identify some words which for us are important, essential elements for environmental education. What does "environmental education" mean to you? What elements would have to be present in an environmental program for it to be called environmental education?

Chris: My impressions are -- I've just been looking through some environmental science textbooks -- and they're called 'environmental science', most of them would be probably 5-10 years old, and the major theme seems to be "activity-centred ecology", and more recently I think the idea of conservation has become built into the idea of extending environmental science and studies, and then even more recently the degree of action-oriented studies built into it. The first time I had ever come across it in a big way was the conference last term. There was so much talk about getting classes involved investigating an issue on such a large scale, then trying to bring it down to terms they can really understand and become involved in.

Bob: There are a whole host of terms around which I suppose we can confuse. I suppose we need to take into account things such as earth science, for example, resource management and use, conservation, and the like. In my own view environmental science would still be distinct from those areas, but in some ways it obviously relates to it.

Rosa: But then aren't you limiting it? Have you had a look at the Year 11 syllabus that has been suggested? That involves politics, economics. If you think 'environmental science', kids think of trees! I really hate that definition, because it is so much more, there is a lot more...

Syd: There is a difference between environmental science and environmental studies. Environmental science is quite a scientific subject, whereas environmental studies...Environmental science course doesn't really encourage you to go into politics a great deal, it is a more practical side, such as forestry management, and water management, and things like that.

Rosa: I disagree. I did environmental science, under that name, and we spent a year doing politics, and another year doing economics.

Syd: No, I'm saying environmental science course as specified by V.I.S.E. I reckon that is environmental studies, as distinct from environmental science. In environmental studies, sure you can branch out into the political area, and so on, whereas if you are going to do environmental science, then you are actually

looking at the mechanics of some environmental problem. In environmental studies, you are not only involved in the mechanics, you are involved in ethics of it, the politics of it.

Rosa: What do you mean 'the mechanics of it'?

Syd: Well, environmental science to me is, as Chris said, ecology, forestry, management of water, and so on; environmental studies, in this you are looking at the political problems that such management might create. You are not worried about the actual, you know "cut the tree down", "what will be the effect of clearing that area of forest?" That's environmental science.

Environmental studies is whether or not that's the right thing to do.

Chris: So environmental studies to you does not incorporate environmental science?

Syd: To a degree it does -- it's there. But it's a far greater thing. Environmental science -- say you're looking at a forest and there are certain problems involved in managing the forest and collecting timber, and the techniques you should use. Right. Now, they're practical problems that have practical answers. Aside from that you also have a lot of theoretical problems and theoretical answers -- "Should we do it at all?" "Is it politically correct?" "Is it ethically correct?"

Rosa: The setting up of a forest -- that mightn't be the only reasons for looking at it, i.e. whether you should set it up or how you should maintain it. Whether it is ecologically "good" to set up something like that comes into it...

Syd: That's the point I'm making, that it is environmental science which stops at the management. Environmental studies goes into the rest of it.

Rosa: So the "Why" and "Whether you should" comes into environmental studies. Just the actual looking at the problem, that's environmental science.

Bob: One is a subset of the other.

Chris: How does environmental education fit into it?

Geoff: What you're talking about is the formal education aspects of environmental education. Do you mean by 'environmental education' just the studying of formal institutions of...Is environmental education only within schools, universities and the like, or is environmental education as conceived of here both the informal, formal and non-formal?

Ian: I can only answer that by saying that the thing that we have agreed on here seems to be that 'environmental studies', to use Syd's term, goes further on than environmental science.

Syd: Yes, but doesn't environmental education mean community awareness, you know, awareness within the entire community not just within a school. So, environmental education does not just

involve sitting down with a classroom full of kids and making them aware through doing practical things; it also includes getting them involved in community projects, making the entire community aware. Environmental science and environmental studies are school subjects, whereas environmental education is a community endeavour.

6.2 What Kind of Education is Environmental Education?

The meaning of environmental education is strongly contested. This is evident at international conferences, in national association journals and in discourse at the local classroom level. In the terms of the "framework of critique" developed in Part I, what forms of education do "education in, about and for the environment" represent?

The three views of education outlined in section 2.4 are distinguished by their goals -- preparation for jobs, autonomous individuality, and social critique respectively. So too are education about and for the environment distinguished by their goals -- awareness development and committed action respectively. It could be argued, however, that education in the environment is distinguished by its pedagogical technique of siting education out-of-doors and in situ in the environment under study. The goals of education in the environment are, then, the goals of the program being conducted in the natural or urban (extra-classroom) setting. A commitment to education in the environment, on this view, does not entail any one particular form of education: each of

vocational, liberal, or socially-critical education could be conducted "in the environment".

On the other hand, it could also be argued that the decision to actually conduct environmental education activities outdoors rather than indoors is an intentional act, one which environmental educators may in fact justify in certain ways that differ to the justifications of education about and for the environment. Consider, for example, the movement within the EE community called environmental interpretation(33). Educational interpretation activities take place "in the environment" -- at field study centres, "interpretive centres", national parks, wildlife parks and the like. "Interpretation" for advocates of this movement does differ from classroom-bound, information-oriented EE:

interpretation is not the mere transfer of information about history or natural science to others, although it must be based on honest knowledge and information. It is not the mere cataloguing of things to do and see, although it should stimulate the visitors to do and see for themselves. It is the helping of a visitor to feel something that the interpreter feels -- a sensitivity to the beauty, complexity, variety, and interrelatedness of the environment; a sense of wonder; and a desire to know. It should help the visitor develop a feeling of being at home in the environment -- to develop perception(34).

"Education in the environment", if educational interpretation can be so termed, appears to be aligned with a liberal orientation to education,. Liberal education sees education as for the "whole person", for "development of a sense of the good, true and beautiful in every child"(35): the quotation above suggests

environmental interpretation to be similarly concerned. Liberal education sees society in need of change, but takes an individualist perspective on social philosophy(36): Colpitts' comments suggest that educational interpretation also adopts this perspective(37)

These visitors (to interpretive centres) wonder what their place is in the world. Why am I here, who am I? What is my just relationship with nature? But above all, what is the part that I am going to be asked to play in a rapidly changing world, a world that is being changed in my lifetime? The National Park Service can play an important part in helping people to understand their role.

All of us who are concerned with recreation in the out-of-doors are challenged by the idea of widening horizons and creating an awareness of the world around us; making more meaningful the forces of nature; and putting into proper perspective the place of the individual in the scheme of nature. All of this is Interpretation -- translation into the language and experience of the participants the story of the world around them.

The work of Van Matre(38) on "acclimatisation" activities considered earlier is also an example of education in the environment, and would also appear to be aligned with a liberal orientation to education, with a very similar emphasis on the sensitisation of the individual to the beauty of his or her environment.

There are some similarities between the assumptions of education about the environment and vocational education. Both emphasise the provision of information and development of intellectual and technical skills for later application -- that is, both adopt the technicist perspective of viewing knowledge as having some objective

worth independent of the context of action. Education about the environment is concerned with discovering "the nature of a study area mainly in the form of knowledge (information) about the particular environment"(39); it is not concerned with political questions such as which sets of values are or ought to be expressed in the present or future exploitation of the particular environment. Neither education about the environment nor vocational education seeks to mount a critique of existing social structures -- they are both inherently conservative.

However, the strongest relationship is between education for the environment and socially-critical education. It has already been argued that environmental education at Tbilisi was seen as integrated and holistic, that educational programs were seen as context-dependent, and that a politicised view of environmental education was advanced. Environmental education was seen as needing to address cases of social inequality and domination, and environmental and social exploitation.

Socially-critical education seeks to engage students in critical analysis of society and social structures immediately, not merely to prepare students for later participation(40): environmental education seeks to provide social groups and individuals with an opportunity for active participation in working towards resolution of environmental problems, and to bring educational institutions into contact with the community and involve themselves with its concerns(41). Socially-critical

education seeks to engage social issues and give students experience in working on them(42): environmental education is centred on current practical problems of the environment, advocates "teaching through action", and adopts the view that knowledge, attitudes and skills assume their full significance in contact with the environment, giving the persons concerned an opportunity of taking part in the social decisions which affect their setting(43). Socially-critical education seeks to emphasise social and critically reflective processes(44): environmental education is similarly concerned, as the quotation below exemplifies(45).

Environmental education should not confine itself to disseminating new knowledge but should help the public to question its misconceptions concerning the various problems of the environment and the value systems of which these ideas are a part. ...All decisions regarding the development of society and the improvement of the lot of individuals are based on considerations, usually implicit, concerning what is useful, good, beautiful and so on. The educated individual should be in a position to ask such questions as: Who took this decision? According to what criteria? With what immediate ends in mind? Have the long-term consequences been calculated? In short, he must know what choices have been made and what value systems determined them.

As this quotation suggests, environmental education goes beyond the exploration of what realities are constructed by particular individuals and groups at particular times (that is, beyond the brief of environmental interpretation), to look also at questions about how and why reality comes to be constructed in these particular ways.

Three key features, then, which suggest that environmental education as "education for the environment" can be regarded as a socially-critical form of education are its recognition of a dialectic between facts and values (expressed as a view of environmental education as a search for the social values and beliefs which justify environmental decisions), its recognition of a dialectic between knowledge and action (expressed as a prescription for learning through active engagement of real environmental issues), and its encouragement of collective as well as individual action in resolving environmental problems. It is by virtue of its socially-critical character that environmental education is a coherent response to the political nature of community concerns about the environment that give rise to the environmental education movement.

6.3 Environmental Education as Educational Reform

Environmental education, with its socially-critical orientation, represents a strong challenge to existing

patterns of schooling. The authors of the Belgrade Charter recognise that the success of environmental education -- the development of a global environmental ethic -- would require a reform of educational processes and systems(46). David Withrington, a British representative at the Belgrade Workshop, reported that the Belgrade Charter incorporates many ideas which would revolutionise British environmental education -- that the active problem-solving, socially-oriented nature of the innovation provides educationists with an opportunity to use it as a vehicle for reforming the educational process(47). The final report of the Tbilisi Conference stresses that "this (environmental education) task requires the application of new concepts, new methods and new techniques as part of an overall effort stressing the social role of educational institutions and the establishment of a new relationship between all those engaged together in the educational process"(48).

Maher, at a national conference of the Australian Association for Environmental Education in 1982, claimed that to be "successfully innovated", a revolution in both the purposes and processes of schooling is required. She specifies three challenges that environmental education poses for institutional education:

1. its interdisciplinarity challenges the subject compartmentalisation of modern curricula;
2. it deals with the topics that are sources of conflict within society -- it aims to question the interests and operations of certain groups in society;

3. it seeks to understand the role of both facts and values in environmental problem-solving(49).

And as recently as October 1984, at the latest international conference for environmental education (Banff, Canada), attended by representatives from 28 countries, the Banff Declaration called for "an unprecedented effort of educators throughout the world to restructure their entire educational programs, to meet effectively the urgent needs of humanity and of the planet"(50).

In discourse at international and national levels, then, environmental education is portrayed by many as offering structural, political and epistemological challenges to institutional schooling: it is portrayed as an effort at educational reform.

6.4 Summary and Conclusion

In this Chapter, it has been established that there are areas of contestation in discourse about environmental education:

(i) between competing definitions, goals, objectives and guiding principles.

For example, there are struggles (as instanced in the Journal of Environmental Education) for "ownership" of certain sets of goals and objectives in environmental education: there is contestation about whether environmental education is "education in, about or for

the environment", or necessarily all three of these; and there are debates about the respective meanings of "environmental education", "environmental science", and "environmental studies".

(ii) between these statements and underlying epistemologies.

For example, "education about the environment" seems to be informed by an objectivist (empiricist) view of knowledge, whereas the politicised "education for the environment" seems to be informed by a post-empiricist view of knowledge.

(iii) between these statements and associated views of innovation.

For example, the claim that environmental education needs to be seen as socially and culturally embedded is at odds with the prescription of an essentially "RDDA" approach to educational change.

(iii) between these statements and associated views of educational research.

For example, a reductionist, applied-science approach to educational research is at odds with an "holistic", integrated notion of environmental education.

(iv) between these statements and associated views of education.

For example, "education about the environment" is aligned with a technicist/vocational orientation to

education; "education in the environment" is aligned with a liberal orientation to education; and "education for the environment" is aligned with a socially-critical orientation to education.

Environmental education is an effort in educational reform. The language of environmental education, while containing threads of continuity and limited agreements, is contested; this contestation reflects different interests and different contexts of work. There are contradictions within and between views -- the debate (the struggle for a non-contradictory, coherent view of environmental education) continues and is necessary to establish commitments in practices and institutions (which can defend and protect the practices).

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CHAPTER 7: CONTESTATION AT THE LEVEL OF PRACTICE: THE STRUGGLE TO TRANSFORM SCHOOLING

Introduction

The purpose of this chapter is to consider the character of educational practices conducted in the name of environmental education. The approach will not be to attempt a comprehensive analysis of environment-related activities, but rather to present a perspective on the impact of environmental education in schools, with examples of actual educational practices, and then to consider in more depth some issues which appear to shape the character of environmental education in formal education.

7.1 Impact of Environmental Education: An Overview

In a report entitled "Current Efforts at the National and International Levels for the Development of Environmental Education" prepared for the Tbilisi conference in 1977, the following "general trends" about the content of environmental education curricula were noted:

in most regions, where formal education is concerned, priority is given, at pre-primary and primary levels, to the natural environment, although several programs exist in each of the regions bearing upon the social environment... At secondary level, the content of environmental education seems to conform very much to the same pattern and there is a tendency for it to be incorporated into traditional disciplines, such as biology or geography. Priority is given to the conservation, preservation and protection of

natural resources, without much emphasis on the social and cultural aspects of the environment(1).

A year after the Tbilisi conference, some concerns were being expressed in the U.S. about the extent of environmental education in the "education system". At an American "national leadership conference in environmental education", Roth reflected that:

In less than a decade we have seen the rhetoric that bills itself as environmental education move from some pilot efforts in a handful of communities, to a National Environmental Education Act, to an international ministerial level conference. Unfortunately we are still a very long way from a comparable escalation of implementation of environmental education practice into the broad education system(2).

Childress(3), commenting on a national survey of U.S. public school environmental education curricula, is more specific in identifying participation in environmental problem-solving as the problematic feature of environmental education practice:

Objectives focused on helping students become knowledgeable about their environment and its associated problems, and developing an appreciation of environmental resources, were considered of more importance in a majority of programs and projects than were those objectives focused on helping students actually solve environmental problems and develop problem solving skills.

And the situation in America may not have altered significantly in the years since 1978. As recently as August 1983, in a paper presented at a national congress in environmental education, Hungerford(4) makes the comment that research tends to suggest that environmental education is not having a serious educational impact

across the USA -- that environmental education in the formal K-12 sector is neither pervasive nor very persuasive -- and reiterates Childress' comments about the problematic nature of participation in problem-solving.

On the Australian scene, the activities of the Curriculum Development Centre's Environmental Education Project(5) provide a "window" into the state of environmental education in recent, post-Tbilisi times. This project sought to obtain accounts of examples of environmental education in operation in schools through an incentive scheme of small scale grants (see "archive" 4.4. in Chapter 4 of this thesis). This scheme was advertised nation-wide in professional subject- and teachers-journals and in newspapers, inviting teachers and others active in environmental education to apply for financial assistance for the preparation of a manuscript depicting their work. The outcome, in terms of the character of environmental education described in the resultant manuscripts, suggested a similar situation to that in the USA -- one of a quantitative increase in the extent of environment-related activities without significant qualitative change in the nature of those activities. In the words of the then Project Coordinator,

whilst it cannot be denied that many subjects in the traditional curriculum of Australian schools have increased their environmental content, there is little evidence that such courses are considering the more controversial political and moral aspects inherent in environmental education(6).

Later, an evaluation of the dissemination and

implementation of the materials of the project was conducted(7). Some 432 schools purchased the Project materials in a fifteen-month period: all were surveyed by questionnaire, and telephone interviews were conducted with all questionnaire respondents who accepted an invitation to be interviewed. As explained earlier(8), the impressions gained through questionnaire analysis and telephone interviewing were that

(i) the materials were being used in support, and within the structure, of existing disciplinary programs rather than in a program of environmental education "in its own right" -- that is, that environmental education practices were largely "teaching environmental education through the disciplines" ;

(ii) for teachers adopting an "environmental education through the disciplines" approach, the discipline medium is science or social studies;

(iii) educational practices conducted in the name of environmental education tended to have as their main aim achievement of awareness-development or sensitisation objectives. Most of the reported environmental education activities were aligned with "education about and in the environment", with the predominant activities being those which contribute to firsthand experience of the immediate, local or distant environment; to the development of understandings -- whether of the informal "sensitisation" type gained on excursions and camps, or the more formal "cognitive" type such as basic ecological principles; and to the development of "fieldwork skills" such as observing, classifying,

measuring, recording;

(iv) environmental education practice tended to be opportunistic: most often, environmental education activities are "slotted into" programs of similar activities already existing within the structure of discipline-based subjects.

There is evidence that this trend towards "education about and in the environment" and neglect of "education for the environment" may be generally-occurring in Australia -- that is, beyond those instances of environmental education supported by the environmental education materials. Professor William Stapp, after an extensive eight-month Fulbright program which included visits to elementary and secondary schools across Australia, states in his Summation Report that there are "some areas which...should be given further attention in an effort to further environmental education", some of these areas are:

- * a general lack of interdisciplinary studies at primary and secondary levels of education;
- * a general lack of problem solving orientation to environmental education at primary, secondary and tertiary level;
- * a general lack of adequate guidelines for teachers and learners in the handling of values, the teaching of controversial issues, and the preparation for students in selecting a project and entering a community to help resolve environmental problems;
- * a general lack of focus on controversial issues in environmental education...(9).

These "areas requiring further attention" are characteristics of "education for the environment".

The foregoing is an overview -- a collection of impressions -- of educational practices conducted in the name of environmental education. The proposition being advanced is that, in the main, environmental education tends to be of the "education about and in the environment" form. This claim is based on a (now dated) UNESCO survey, the opinions of key-note speakers at two national conferences in the U.S. (one quite recent), the findings of a national curriculum project in environmental education in Australia, a separate evaluation of the outcomes of that national curriculum project, and the findings of an extensive, eight-month appraisal of Australian environmental education by a visiting Fulbright scholar. It is recognised, however, that the claim is based on evidence that is patchy rather than comprehensive and systematic, and that the proposition is expressed as a generalisation to which exceptions exist.

7.2 Some Specific Examples of Environmental Education Practices

Concrete examples of educational practices which fit the general "education about and in the environment" are relatively easy to find. At Bellaire Primary School(10) in Geelong a short environmental education program was based on the topic "litter". The program comprised five activities:

- (i) a class discussion aimed at defining the term "litter", and establishing a number of classes of litter;

- (ii) a class discussion on the causes of litter -- reasons cited included carelessness, laziness, insufficient or ineffective bins, wind;
- (iii) an outdoor activity in which litter was collected and classified;
- (iv) a classroom activity in which reference material on methods of litter disposal was read by the pupils;
- (v) a classroom discussion in which alternative "solutions" such as a greater number of bins, improved design of bins, and "hidden cameras" were suggested.

A teacher at Iramoo Primary School reported a similar program to that at Bellaire for his grade 2 pupils(11). He comments that

The project commenced in my grade during the early part of May, although the children had devoted 3 to 4 weeks of April and March towards a local rubbish campaign instigated by the Werribee Shire. The kit "Do the Right Thing" was used as a teacher's resource. The children, individually and in groups conducted paper counts, home rubbish and school rubbish surveys, and recycling experiments. The children completed the unit by winning a sculpture competition (using recycled materials) for which the school was awarded \$25.00. The children therefore had experienced and carried out strategies which were directly linked to encouraging the growth of a positive and thoughtful attitude towards their immediate environment...Most of the content of my sessions was related to both the man-made and natural aspects of the environment. The "adopt-a-tree" sessions which followed Arbor Week gave the children a chance to discover both the influences man has on trees as well as the influence of trees on man and our dependency on them for many products. Topics such as the "adopt-a-tree" mentioned above and a theme on insects and the most recent sessions on habitats and suitable environments ("miniworlds"), lasted for no more than three weeks each.

In Australia and overseas there is a number of "field

study centres" in which "interpretive" EE practices take place. These activities aim "to reveal meanings and relationships through the use of original objects, by firsthand experiences, and by illustrative media, rather than simply to communicate factual information"(12); such firsthand experience, of course, usually entails out-of-classroom settings.

An Australian example of such an interpretive centre is reported by Enchelmeier and Veacock(13). These writers mention that the activities of an urban field study centre ought to include investigations into

- * historical background of the area;
- * relief, vegetation, soil characteristics;
- * characteristics of the built features: planning and architecture;
- * present political, social, economic and cultural influences;
- * intrusions into the area -- noise, traffic, people, smoke or fumes;
- * the independence or dependence of the area;
- * natural or imposed boundaries -- i.e. town planning zones;
- * aesthetic considerations.

The writers also comment on the role of field study centre staff:

Irrespective of whether the investigations are to be carried out by primary or secondary level students, there are certain skills and knowledge necessary for the interpretation and investigation of the urban area. It is therefore useful to have someone who can act as interpreter of the area and be responsible, in the main, for

the preparation of programs, and the development of urban study techniques, as well as to act as collector and distributor of the relevant resource materials.

Some of the specific activities described by Enchelmeier and Veacock are:

- * sensory experiences: pupils are blindfolded and placed in settings in which senses other than sight are stimulated;
- * investigation of a land use zone;
- * exploration of a topic related to the environment (eg. "city waste"; "urbanisation"; "change").

Activities of this sort contribute to the aims of the urban field study centre:

- * an understanding of the past and its effects on our present environment and way of life;
- * appreciation of the present -- how man, and what he has structured -- affect one another;
- * active participation in planning our future so that our ways of life can be in tune with sound environmental thinking(14)

Other examples of interpretive approaches to environmental education -- approaches aligned with "education in the environment" -- can be found in Sharpe(15) and in Cowan and Stapp(16).

As mentioned earlier, there are exceptions to the general "education in and about the environment" pattern of environmental education practice. For example, at Torquay Primary School(13), a teacher and her class of

grade six pupils became concerned about new residential developments along the nearby coastal fringe. She and her class engaged in the following activities:

(i) Excursions to the site of the planned development -- observation of the types of buildings already in the area; of the types of use to which the proposed development site is already put.

(ii) Class discussion about likely effects on immediate residents, the township of Torquay, and tourists. Discussion supported with drawings of planned development.

(iii) A series of excursions and visiting speakers to supply information about:

(a) history of the area: previous use; changes in zoning regulations;

(b) the views of local residents and town business people;

(c) the views and reasons of the principal of the land development company;

(d) the decision-making process - a visit to the local council and discussions with the town planner, shire engineer, and building inspectors.

(iv) Class activities involving:

(a) discussion about what is now known of the relationship of the local council and the development company, the reasons for re-zoning of the land, and the criteria used for validating the decision;

(b) a class debate about the issue, with "For Development" and "Against Development" sides.

In her account of this investigation, the teacher cited a

number of questions addressed by her pupils:

1. When was it decided to use the land as a development resort?
2. Who gave permission for this to be built?
3. What facilities are they building and who will be able to use them?
4. What is going to happen to the shop keepers and businesses already in Torquay?
5. What happens with the additional children that will come to Wombah Park regarding their schooling?
6. Who is going to pay the \$4 million needed for development?
7. How much land has been used over-all?
8. What about the local residents who retired to a quiet place?
9. Will it perhaps begin two separate townships?
10. What would happen to the land should development be a "fizzer"?
11. What playgrounds and parks are available for tourists and residents?
12. How will the development effect our beaches regarding litter, pollution, sewerage etc?
13. Will all our rates increase with added development?

In a similar example, a teacher at Rollins Primary School(18) and her grade 6 class investigated an issue in which a tower at a nearby park had been removed. The tower was a popular play structure for children in the area, but was also regarded as a safety problem. Activities organised by the teacher included :

- (a) An excursion to Darriwill Park: "investigation of the grounds, setting, overall design of the park, surrounding environment, area where the tower stood. Sketches of Darriwill Park to be done by children so as they may be used for later reference".
- (b) Excursions to other parks: sketching of design features for comparison with Darriwill.
- (c) Interviews with local residents: questions include
 - * where was the tower actually standing?
 - * would you like to see it put up again?

- * what would you like to see done with Darriwill Park?
- * do your children use the park?
- * if another tower was built, what differences would you like to see in it?

(d) Survey of number of children using Darriwill Park.

(e) Interviews of children using the park: ascertain feelings about the tower and the park in general.

(f) Write to local newspapers: children make public their own feelings about the issue.

(g) Writing a letter to the local council: "children write a letter to the council expressing the issue they are researching and requesting explanations to their question by letter or, if possible, by organising for a speaker to come and talk to the class personally".

(h) Visiting speaker (from the local council): could "talk to the class about the decision-making processes involved when deciding on the resolution of the issue". Questions prepared by the class to put to the visiting speaker included:

- * if we want the tower to be rebuilt, how do we go about it?
- * how can we go about the improvement of the park?
- * how are decisions concerning issues made?
- * if we designed a new, safer and better tower, would it be considered with our proposal?

(i) Decision-making: children prepare speeches and research the roles of the people they will role-play in a simulated "town meeting". This simulated town meeting provides a forum for children "to decide on what is to be done about the issue. They need to consider

everyone's views and come up with a decision. Once the decision has been formed, (there is) discussion on the action to be taken to have the issue resolved".

(j) Proposal to the council: "complying with the rules of the Council, children write in their proposal, asking for action to be taken".

Contestation

There is evidence of contestation in educational practices conducted in the name of environmental education. As stated earlier, the overall impression is that the dominant forms are "education about and in the environment". The rarer form is "education for the environment" -- that which, in the words of UNESCO, emphasises "the social and cultural aspects of the environment" and which are, perhaps, exemplified in the elementary school by the last two examples given above. These three forms of educational practice are not simply alternative, compatible or equally and jointly acceptable expressions of environmental education -- they are logically incoherent.

Educational practices of the "education about the environment" type, which are (a) "incorporated into traditional disciplines such as biology or geography", (b) emphasise interactions within the natural environment rather than interactions between the natural environment and the greater social/political context, (c) focus on "helping students become knowledgeable about their

environment and its associated problems" rather than helping students "actually solve environmental problems", and (d) generally neglect "the more controversial political and moral aspects inherent in environmental education" are informed by an empiricist view of knowledge. Such educational practices can only be justified by assuming that knowledge is objective -- in particular, that environmental problem-solving is not influenced by social and political values.

It could be argued that educational practices of the "education in the environment" type, particularly the movement termed educational interpretation, is in fact justified by a hermeneutic (subjectivist) epistemology. Environmental interpreters develop, and encourage other participants to develop, interpretive constructions of the meanings of aspects of observable environmental reality:

The interpreter attempts to make clear the meaning of unseen, unknown, or misunderstood phenomena to promote understanding and broaden the knowledge and awareness of program participants(19).

Interpretation (is) translation into the language and experiences of the participants the story of the world around them(20).

Today there is a healthy trend towards maturity in interpretation. A vital and meaningful form of recreation is emerging with potential for mental and spiritual uplift for people of all ages, interests and backgrounds...(The) talents and skills of engineers, artists, historians, and naturalists are being combined to give life and meaning to stories of natural phenomena and historic events(21)

Sakof argues that the distinguishing feature of environmental interpretation is its concern with

explication of the subjective meaning of environmental knowledge -- or, as he puts it, how that knowledge is linked directly to our lives:

Failure to make such connections is a lost opportunity to influence an individual's values and political positions regarding human activities and practices directly related to the scientific content of the interpretive presentation; activities and practices which may have direct and profound impact on the quality of our lives...(22).

Educational practices associated with environmental interpretation are more readily justified by reference to an hermeneutic/subjectivist view of knowledge than a critical/dialectical epistemology in that the interpretive constructions of environmental reality are perceived as individualist and relative ("interpretation can be viewed as a place-specific, organisation-sponsored, leisure time activity or process involving nonformal environmental education..."23), and stops short of advocating action based on any preferred, alternative interpretive construction:

interpretation thus plays a basic role in coming to grips with environmental quality problems, although it in itself cannot do the entire job. It stresses problem identification, diagnosis, and the presentation of alternatives for improving the situation. It does not include an evaluation of these alternatives and the selection from among them of the particular course of action to be pursued. This must be accomplished through activities, organisations, and techniques for reaching consensus that lie outside the domain of interpretation(24).

Conversely, educational practices which emphasise education through action (the action of investigating environmental issues) rather than the provision of

disciplinary knowledge, and which emphasise a socially-critical search for the influence of social and political values on environmental decision-making, require for their justification a post-empiricist view of knowledge -- one which assumes knowledge to be constructed socially and with interest.

So, in the case of the environmental education movement, we seem to be faced with a situation in which the language of the UNESCO/UNEP program in environmental education is not matched eight years on by changes in educational practices at the classroom level. The language of environmental education, though contested, favors a politically, socially-critical form of meaning ("education for the environment"); educational practices, though contested, tend to express the non-politicised, objective "education about the environment" or the interpretive "education in the environment". That is, contestation exists within the level of language (between different expressed meanings), within the level of practice (between different educational practices), and between the level of language and the level of practice. In response to the last form of contestation -- called by some a "rhetoric/reality gap", Maher poses the question "Are we reviewing a subject which is merely having innovation 'teething problems' or is the innovation a failing one?"(25). She opts for the second assessment.

7.3 Issues Shaping Educational Practices in Environmental Education

Commenting on a perceived lack of a "problem-solving orientation in contemporary environmental education, Hungerford(26) suggests that one probable cause of the situation is "entrapment in institutional settings dictated by others or not susceptible to change". The intention in this section is to examine the institutional context and to explore a number of factors which seem to shape the character of environmental education in schools; in doing so, further examples of contestation will be considered.

1. Textualisation

Throughout the environmental education movement, there has been a perceived need for the development and implementation of curriculum materials to facilitate the achievement of the aims of the movement. Several of the recommendations of the Tbilisi conference(27) related to the development of materials; Australia's Environmental Education Project materials were a response to that perceived need(28); in a recent North American survey(29) of K-12 teachers, over 80 percent of respondents indicated agreement or strong agreement with the proposition that curriculum materials needed development; and as recently as September 1982 many countries were reported as being of the opinion that one of the principal difficulties in environmental education lies in the quantitative and

qualitative inadequacy of teaching materials (30). The development of teaching materials, then, is a typical response to a perceived need for an educational innovation. However, the educational change strategy of developing teaching materials, and the actual structure of the materials themselves, shape educational practices at the classroom level in a way which may diminish the socially-critical character of environmental education.

Consider a specific, recent example. It has been argued earlier(31) that the materials of the Environmental Education Project(EEP) are a concrete representation of unresolved differences in perceptions of environmental education, both substantively and procedurally. That is, there is conflict between the language of environmental education, the structure of the materials, and the processes of dissemination invoked in respect of the materials. The comments of a classroom teacher using the EEP materials(32) provide a practitioner's perspective on the effect that such contradictions can have on educational practice at the classroom level. The teacher, who purchased all four publications of the EEP for use in his rural school, saw the flexible structure of his rural school as affording classroom opportunities for environmental education -- that is, there were no major perceived constraints on implementation. In fact, extensive use had been made of Exploring Outdoors(33) in support of an existing nature studies program in the school. In this teacher's view, the materials encourage two types of reaction from teachers: materials like

Streets(34) and Exploring Outdoors invite an opportunistic type of use, where the materials are "plugged-in" to existing programs, used as "fillers" or "stop-gaps", or employed to initiate an already-planned topic; materials like the "planning" section of the Primary Sourcebook(35) offer support for the development of a new, original environmental program. The latter "planned change" option is seen as having two distinct phases -- planning and implementation -- and while the teacher believes his particular setting to be sufficiently flexible to permit the implementation of a planned, original program in environmental education, he perceives the everyday routine management responsibilities of a rural school as a constraint to the time consuming task of actually planning such a program. Thus, the teacher sees himself confronted with the "forced choice" of exploiting the "ready-made utility" potential of materials such as Exploring Outdoors and declining the "planned change" invitation of the "Planning Section" of the Primary Sourcebook.

Reactions of other teachers support the view that the materials invite two different types of reactions -- one in response to their "planned change" potential and one to their "readymade utility" potential. Positive comments about the Primary Sourcebook relate to its value in assisting in the formulation of aims(36), and in at least one case(37) the booklet was purchased with its potential for curriculum change in mind. On the other hand, positive comments about Streets and Exploring Outdoors focus on the ability to function as a source of practical

activities(38) -- usually in support of an existing program in science or social studies. So from the teachers' point of view, the materials can be appealing on two grounds: for those with interests in planned change, the Primary Sourcebook is seen as important; for those with interests in obtaining further support for existing programs, parts of the materials are capable of fulfilling this "utility" function.

The educational change strategy of developing curriculum materials as texts (presenting an account of what should be taught, and how it should be taught) is based on a technicist view of education(39). The strategy can only be justified by accepting an empiricist view of knowledge as objective and transferable. The theory embedded in such materials is the developers' theory, not the teachers' theory. This is the case in the EEP materials. So if there are constraints against teachers' engaging the developers' theory through program planning (as reported in the "rural school" example above), and especially if textual materials are partitioned with "ready use" activities separate from and not representative of the developers' theory (as is the case in the EEP materials), then the most likely form of use of the materials will in fact be to support existing educational practices. The materials can be said to be used, and environmental education said to be happening because the materials are in use, in patterns with only partial resemblance to those implied in the conceptual framework. One of the two invitations implicit in the

structure and availability of the materials, then, is consistent with a non-innovation "utility" form of environmental education -- a form which has the characteristics of "education in, and about the environment", but not "education for the environment". The materials may become agents of continuity.

The Investigating the National Estate(40) kit of environmental education materials provides an example of the influence that the structure of textual materials can have on educational practice at the classroom level. The theme of these materials concerns the processes by which aspects of Australian heritage are determined to be of sufficient worth as to be entered in the "Register of the National Estate", and their subsequent management. The materials comprise a Teachers Handbook and four separate "Units" or collections of activity cards(41). The intent of the developers seems to be that the activities of Units 2-4 support the interdisciplinary aim of Unit 1 of exploring issues involved in managing the "National Estate" by providing respectively the aesthetic, historical and ecological criteria frequently invoked in such management(42). In short, the areas of study represented in Units 2-4 need to be viewed as tools to be drawn upon to facilitate the achievement of the kit's aims, which relate principally to the concepts introduced in Unit 1. However, at the level of the classroom practice this intention does not seem to have been substantially translated into reality(43). Unit 1 tends to be the least used unit of the kit; the materials of Units 2-4 tend to

be employed, in the main, in opportunistic fashion in support of existing programs in Art, History and Science respectively. Units 2, 3 and 4 appear to invite inspection by, and at least appeal most readily to, teachers in these three subject areas. The strength of commitments to existing programs in these discipline-based subject areas seems to be sufficiently great to cause the materials, as currently presented, to be subordinated to duty in support of existing disciplinary programs.

Texts and Continuity

These two concrete examples point to an important issue in environmental education. The specific issue is that materials designed (in their packaging and availability) with a "teaching environmental education through the disciplines" approach in mind are predisposed to a disciplinary interpretation, which puts at risk the interdisciplinary aims of the innovation and which supports the continuity of existing disciplinary structures in schools. The organisational decision by developers and/or disseminators that the presentation and/or distribution of environmental education materials ought to recognise the prior importance of discipline-based subjects diminishes the chances of success of an interdisciplinary, problem-solving form of environmental education. A more general issue concerns the relationship between the innovation and the educational institution it confronts as a reform effort. Attempts to promulgate environmental education with textual materials

which support existing environment-related programs (for example: nature study; natural science; geography) through the provision of activities for "education about and in the environment" can be interpreted as a broader legitimation of conventional patterns of schooling -- of curriculum structure and teaching practice -- and these patterns may be inconsistent with the socially-critical character of environmental education. (These issues will be discussed more fully in the next 2 sections).

For example, to the extent that supporting "education about the environment" in turn supports a pedagogy approaching science education, many environmental texts, like many science texts, may legitimate a paradigm of science which fails to develop critical thinking -- a crucial feature of socially-critical environmental education. The view that science texts may operate in this way in science education is attributed by Siegel(44) to the work of Kuhn(45):

According to Kuhn, science education has, in general, been geared to the inculcation in the student of the dominant scientific paradigm of the day. Much of science education has been geared to the production of competent researchers, and successful research can only occur in accordance with the methods and definitions of the paradigm in which the problem being researched exists. Consequently, science textbooks are, and have typically been, designed so as to encourage neither questioning nor critical scrutiny; they are, and have typically been, designed as to empower the student to master the techniques of the relevant paradigm(46).

The suggestion here is that environmental education materials which manifest an "education about the

environment" interpretation, and which are designed in a way which supports existing science programs, are susceptible to the same critique. Such textual materials are effective in developing expertise in what is essentially a science paradigm; they may also fail to develop the student's critical thinking abilities -- in respect of the science paradigm itself or, in consequence, of the role of science in the resolution of environmental problems(47).

The main point in this section is that environmental education textual materials which are designed to support a "teaching environmental education through the disciplines" approach -- in particular those which emphasise "education about the environment" -- actually reinforce the disciplinary structure of school curricula with probable negative implications for socially-critical environmental education. Since the textual materials are produced and distributed in the name of environmental education, this is not a criticism of teachers, who employ the materials in good faith. This section is a critique of the way texts are presented for use in the absence of opportunities for dialogue about the meaning of environmental education and the relationship between meanings and practices. The offering by developers, and acceptance by teachers, of textual materials embodying an "outsider's theory" ^gsuggests an empiricist (positivist) perspective and does not necessarily engage or develop the theories held by teachers. Thus the issue for textualisation cannot be seen as separate from

organisational issues such as patterns of materials development and dissemination.

2. The Discipline-Centred Curriculum

The concern expressed in the previous section implies the existence of a major dilemma for environmental education: the international language of environmental education stresses the need for interdisciplinary approaches; the institution in which the environmental education practices are enacted is strongly disciplinary in structure.

The proceedings of the Tbilisi Conference in environmental education have made it possible to define four characteristics of an education in accord with the ultimate aims of the innovation as identified at the conference(48). One of these is "an interdisciplinary educational approach", about which a UNESCO document on the conference says:

Discarding the frontiers separating specialized disciplines, the interdisciplinary approach seeks to give a more comprehensive and less cursory picture of the problems. It does not consist in juxtaposing different disciplines on an a priori basis but in grasping the process in its entirety and then proceeding to analyse and solve the specific problems(49).

In this description of an interdisciplinary approach it is the environmental problem rather than the objectives of different discipline-based subjects which acts as the chief organising principle of an educational program in environmental education. According to a perspective on

interdisciplinarity in which environmental problems act as supra-disciplinary organising principles, discipline-based subjects are drawn upon to provide a variety of skills for investigating the environmental problem at hand. For a given environmental problem, a particular mix of disciplined thinking (the skills and knowledge of established disciplines) is required; accordingly, in an educational program organised around that issue, a particular mix of activities drawn from a range of discipline-based subjects is appropriate. These activities are included in the program not because of their relationship to some pre-existing set of objectives of discipline-based subjects, but because of the relationship of the disciplined thought which they exercise to the problem under study. Different environmental education programs based on investigations of different environmental problems involve different mixes of disciplined thinking -- this contrasts with the relatively more systematic exercising of disciplined thinking in educational programs where disciplinary objectives are paramount as organising principles. Hence an environmental education program is inter-disciplinary when the ultimate organising principle -- the criterion or set of criteria which one refers to when selecting and sequencing educational activities -- is the critical investigation or understanding of an environmental problem. This questions the value of the view that curricula should comprise pre-planned, systematic coverage of disciplinary content for its own sake.

However, the context of institutional education in which attempts are made to promulgate an interdisciplinary approach in the name of environmental education is one which does value such systematic coverage of disciplinary content. Both elementary and secondary schools are typically organised around a timetable grid which apportions blocks of time to conventional discipline-based subjects. This practice reflects a "discipline-centred curriculum" perspective in which it is accepted that certain knowledge categories exist (an objectivist assumption) and can serve as frames of reference for the processes of social reproduction (that is, the reproduction of the social relations of production in society). While perhaps initially proposed as logical constructs to assist in the systematic organisation of knowledge to serve practical needs of communication and action, these frames have tended to become reified to an extent -- to be seen as ends in themselves, and the knowledge they circumscribe as having a priori worth. Maintaining disciplinary boundaries has become equated with maintaining "purity" of knowledge. Attempts to subject these traditional knowledge categories to transformation tend to be restricted; the tendency has been to accommodate new knowledge in the curriculum through ad hoc processes of accretion, deletion, modification and compression(50). Subject boundaries, then, act as strong constraining influences in the discipline-centred curriculum -- a pattern that is still dominant in schools. This can be understood as another example of contestation, with conventional subjects and

organisation patterns based on an objectivist view of knowledge contesting with a new "subject" requiring and organisation based on a different epistemology.

Thus, it is perhaps to be expected that the strong disciplinary quality of institutional schooling has a significant shaping effect on the environmental education innovation. In the case of the Environmental Education Project and the Investigating the National Estate project, the materials were used in a way which, despite the interdisciplinary intent of environmental education, was consistent with a disciplined-centred curriculum. The materials were used in support of existing disciplinary programs -- the organising principles of those programs continued to be the objectives of discipline-based subjects(51). In fact, the materials were predisposed to being viewed from a disciplinary perspective from the moment they arrived in the school, as a function of the habitual working procedures adopted by administrators and teachers in dealing with the steady inflow of curriculum information and materials. According to one principal interviewed in relation to the EEP, head teachers react to the steady stream of incoming materials by attempting to categorise material to a particular subject area -- that is, the notion of disciplines affects within-school diffusion patterns(52).

The particular subject in the discipline-centred curriculum with which environmental education is most commonly associated is science. Almost all of the

school-level projects and programs reported in Schoenfeld and Disinger(53) have a major science component in them. In a later survey of environmental education in United States schools (K-12), Disinger(54) reports that recent and current environmental concerns are often related to the constraints of the curriculum, particularly science and social studies. In a recent (September 1982) UNESCO statement on progress, trends and prospects in environmental education(55), the point is made that "the dominant trend in strategies for the incorporation of the environmental dimension into the formal educational process has been to 'infuse' content relative to various environmental problems into the natural sciences". The same trend emerged in the evaluation of the Environmental Education Project(56). That is, environmental information is introduced as content alongside the array of facts, concepts and theories of conventional science programs.

The tendency for environmental education to be associated with any single existing subject obviously operates against the interdisciplinary quality of the innovation. Environmental problems introduced as content into existing programs are not treated as the chief organisational principles of the program; their role remains in a sense subordinate, as additional content aimed at achieving certain disciplinary goals. The potential that environmental problems have as interdisciplinary organising principles is overcome by the strength of the disciplinary pillars of the institution. One of the "barriers to environmental education"

encountered by members of the "Geelong Secondary Cluster Group" (as reported in section 5.1 of Chapter 5) was:

the perceived primacy of planned content of existing (discipline-based) syllabuses over related environmental education activities regardless of how arbitrary the criteria used in the initial planning of those syllabuses may have been.

There are other arguments which suggest that the relationship between environmental education and science may be particularly counterproductive. One issue concerns the essentially specialised character of scientific research traditions:

An interdisciplinary approach dealing with the complexity of environmental problems throughout the educational process and providing a basis for effective action designed to solve them are still difficult to achieve in most countries. The first obstacle lies in the institutional strategy of today's scientific practice. Research is generally conducted in a number of specialized disciplines which are still not sufficiently interrelated, and it is therefore unlikely at present that a given reality will be approached in an integrated manner, when scientific knowledge itself is being generated(57).

An even more fundamental incompatibility exists between the aims of environmental education on the one hand and the world-view promulgated by conventional science education on the other. The incompatibility resides in the perceived relationship between knowledge and values, and represents a clear example of contestation.

The position of the progenitors of the environmental education movement internationally on the relationship of knowledge and values is clear: it is that values are inevitably involved in all matters of environmental

decision-making, and that an understanding of the role of values in environmental actions of all types is a proper goal of environmental education:

Values and choices are the principal organisers of action. Environmental education will not then realise its full potential unless it stimulates individuals to clarify the choices underlying decisions...The solution lies not in communicating a system of values, but rather in systematically explaining prevailing values at all levels of educational process(58).

It can be argued, however, that science is not well suited to the task, since, as explained in Chapter 2 (section 2.1), the epistemology of natural science is an empiricist one which supports a form of problem-solving that is objective and instrumental -- that is, seeks deliberately to separate "values" and "knowledge", and removes the former from scrutiny(59).

The "mechanistic", "objective" and "universal" tenets of the commonly-accepted scientific paradigm would appear to render an education aiming to promulgate those tenets inappropriate to the task of understanding the value-laden and context-dependent character of environmental problem-solving. Although science has an obvious subsidiary role to play in the provision of technical information at stages of investigations of environmental issues that adopt a critical perspective overall, there seems to be an incapacity on the part of science education to serve as the major vehicle for promulgating environmental education objectives. The teaching of environmental education within a framework of science education which seeks to preserve the basic tenets of

science inevitably results in an emphasis on those interpretations which cohere most closely with those tenets: these interpretations are expressed in educational practices of the "education about the environment" type. As long as environmental education is thought of as a step-child of science education, this most fundamental of issues remains.

In summary, this section has proposed that:

- (i) the strong disciplinary structure of conventional curricula accommodates environmental education at the expense of its interdisciplinary characteristic (this process being aided and abetted by the availability of texts which carry the name of environmental education and present an "education about the environment" perspective);
- (ii) the discipline-based subject with which environmental education is typically associated is science;
- (iii) this association may be a counterproductive one because the tenets of science, and hence the objectives of science education, are ill-matched to the task undertaken by environmental education -- namely an understanding of the value-laden and context-dependent qualities of environmental problem-solving.

3. Habitual Teaching Activities

The issue being addressed in this section is the relationship between habitual teaching activities (the

conventional pattern of interactions between teacher and student) on the one hand, and environmental education practice on the other. Put another way, what is the nature of the contestation between different teaching activities conducted in the name of environmental education?

An official UNESCO publication on issues in the field of environmental education post-Tbilisi recognises the problematic nature of the relationship between teaching methods and environmental education, claiming that the "development of environmental education gives rise to specific problems with regard to teaching methods", and that "of the more important measures to be taken, mention should be made of those relating to teaching methods..."(60). The authors identify some difficulties and suggest some changes in teaching methods in the light of the Tbilisi recommendations. They point out that most teachers are unfamiliar with interdisciplinary techniques and problem-solving, and that educational activities have been unable to make the break with formal schooling and to involve pupils in community life. Some of their recommended changes are:

- (i) team teaching, to enable individuals from different disciplines to work together in preparing curricula;
- (ii) bringing the school into contact with the community;
- (iii) interdisciplinary teaching strategies;
- (iv) problem-solving approach (61).

These recommendations are clearly related to and

consistent with the "guiding principles" for environmental education generated at the Belgrade and Tbilisi conferences. They are also still at a fairly general level, and do not specify teacher activities. When discussing the "problem-solving" approach, the authors provide an insight into what teacher activities might be appropriate in the case of environmental education. The "problem-solving" approach, they say, involves a search for values which may be referred to in analysing the facts of a situation and seeking a solution to them, and that

In order to identify these values, teachers should create an atmosphere of trust and mutual respect and encourage discussion in the classroom, so that pupils can exchange their points of view and put forward arguments to support them. The next stage especially when it comes to looking for possible solutions, will be for the teacher to enable pupils to compare and explain the choices they have made and also to help them to discover other systems of values(62).

These comments suggest that an aim of the problem-solving approach is the development in students of the confidence and ability to advance and defend their own propositions in respect of an environmental issue. These characteristics require a setting which features not only "an atmosphere of trust and mutual respect", but also a sense of independence; in particular, students need to be freed of the perceived need to fall in line with or adopt the value-position of authority-figures -- of teachers -- in respect of the issues under consideration. The matter of learner autonomy, then, is a central component of educational practices consonant with the language of environmental education. It has been argued earlier

(Chapter 6) that environmental education is socially-critical in character, so the question becomes "What teaching activities are consistent with the socially-critical character of environmental education -- and, in particular, preserve learner autonomy?"

Kemmis, Cole and Suggett(63) describe a number of educational practices that are consistent with socially-critical education. They suggest that the socially-critical teacher is:

a project organiser and resource person, organising critical and collaborative activities in negotiation with students and community demanding joint values of autonomy and social responsibility. (The) teacher is a coordinator with an emancipatory aim; involves students in negotiation about common tasks and projects; emphasises commonality of concerns and works through conflicts of interest in terms of social justice based on many-to-many relationships between community, teachers and students...(The student learning role is that of) a co-learner, using available knowledge through interaction with others in socially-significant tasks of critique or collaborative work.

Another suggestion is that the teacher utilise the investigation of an environmental issue as a context or vehicle within which pupils exercise their skills in gathering perspectives, seeking information, advancing and defending propositions, and making decisions. The teacher's role in such a setting is to establish the conditions for the issue investigation -- to assist in identifying the issue, and in improving the access of students to the issue -- and to facilitate and sharpen the debate held in respect of the issue. Specifically, the teacher's activities might include the asking of "real

questions" (those to which the teacher authentically does not have an answer)(64), and such "neutral chairmanship" activities as encouraging the expression of multiple perspectives on the issue, and restricting verbal interventions to provision of procedural guidelines and, perhaps, comments on the logical basis of the arguments advanced by students.

Activities of this type took place in both the GSCG study (section 5.1) and the SBEE project (section 5.2) reported in Chapter 5 of this thesis. In the GSCG, Syd explored "neutral chairmanship" at his urban secondary school. His class investigated an environmental issue concerning the construction of a bitumen road through a coastal sand-dune area. Contending points of view in this issue were recreational (access to the beach), safety (access to a surf lifesaving club), and ecological (perturbation of a delicate ecosystem). The structure of the issue investigation was: and excursion to the site of the proposed road; interviews of interested parties; visiting speakers representing the Country Roads Board and a local conservation group; class debate. The teacher wished to adopt a neutral chairmanship role because he was aware of the influence his own values had on the pupils, whom he felt ought to "make up their own mind" on matters like environmental issues. The neutral chairmanship role turned out to be difficult -- his conventional educational practices, he felt, were not in the interests of "symmetrical communications" between himself and his pupils (this in fact was the justification for adopting

the "neutral chairmanship" role), yet his adoption of that role led, in his view, to communication asymmetry within the group of pupils:

Syd: By being the chairman, the more vocal, who tended to be those pushing the strongest anti-CRB line, I took more notice of them maybe because I was conscious of it, that they were pushing a much harder line.

Ian: Why do you feel it is necessary to prevent the more vocal ones from taking over?

Syd: I think the whole thing would have got unbalanced. It would have been all very well to argue this and that and tell them what is against it, but there were a lot of the quieter kids agreeing with this. I've been to any number of public meetings -- and those people who can shout the loudest...

Ian: Well, maybe that's the way it is...

Syd: No, because in the end those people tend to lose a lot of credibility, no one takes any notice of them...

Ian: It's interesting, because it means you have taken, as the teacher, because you are in a position of power acting as chairman and you've had the awareness that they could have a dominating influence because they are pretty articulate and so on, that you took steps to prevent that happening. I wonder what would have happened if a student had been in the chairmanship role?

Syd: I think it would have developed into a shouting match which happens in public. It could have been a useful exercise, and like a public meeting got exactly nowhere, or it could have created animosity. I think a good chairman of any meeting...

Bob: The next question -- were you aiming to get consensus out of the discussion that takes place or do you aim to divide the group right down the line?

Syd: I think they're restricted in the school situation. You're pinched for time. It's not like a public meeting when you can start at 8 o'clock and go on until everyone drops. You've got to teach the kids the next day, which is another problem. Those kids have to come back, they had other work that they had to do that day, so in a way I had to keep a bit of order in the discussion just so I could be sure that I could settle them down again. That's probably one role a teacher chairing a meeting has to take whereas a chairman of a public meeting wouldn't have to.

A teacher in the SBEE group was dissatisfied with the

scope his questioning allowed pupils themselves to ask searching questions of each other and of adult figures about environmental problems. His approach was to engage his pupils in a lesson in which a controversial environmental issue was debated, and to reflect carefully on his own role -- on the relationship between his own utterances and those of his pupils. After reading a transcript of the lesson, he found there were a number of pupils who were not participating, and he felt he was being too directive of proceedings. He sought to overcome this problem through an organisational change: he divided the class into a number of small groups, again for the purposes of discussing a controversial environmental issue. On reading a transcript of this lesson, the teacher found that the children were questioning each others' statements to a greater extent and were drawing upon knowledge previously established by other children to a greater extent. The teacher explored the relationship between the level of intellectual demand built into his questions (he used a modified Bloom's taxonomy) and the complexity of pupils' responses (using the SOLO taxonomy)(65), and whether his physical presence in discussion groups was "getting in the way" of the development of children's participation in socially-critical discussions of environmental issues.

These are examples of teachers who perceive their conventional teaching activities as being in some sense at odds with their view of how environmental education ought to be taught. They attempted, with variable success in

their own estimation to change their educational practices. The general teaching activity which they both felt was at odds with the spirit of environmental education (as perceived by them) was the behaviour of dominating the discourse of the classroom. Some specific teaching behaviours thought to be associated with discourse domination are listed by Evans et al (66):

- * rapid-fire question and answer sequences to involve the student and to hold their attention;
- * asking leading questions and making leading statements about recalled information or simple reorganisation of known information;
- * rejecting or discouraging responses and ideas;
- * reinforcing responses and ideas with praise or other forms of positive feedback;
- * inviting consensus and then rephrasing students' comments in a summary and/or conclusion which contains more of the teachers' ideas than the students.

The overall impression conveyed to students through long-term involvement in these teaching activities is that the teacher possesses an answer -- "the correct answer" in the form of factual information -- and that ultimately, as a result of the dynamics of the teacher/student interactions this answer will duly emerge, in a form validated by the teacher. This establishes the teacher as an "authority in knowledge" and in turn establishes an authority hierarchy in favor of the teacher. In a classroom setting, an authority hierarchy operates against the development of learner autonomy, and in favour of an

"Is that right, Sir?" syndrome in which the teacher is perceived as the ultimate source of legitimate knowledge(67). The danger in this situation is that the students are placed in a passive, subordinate position with respect to knowledge and are thus predisposed to the influence of the teacher's attitudes and values. If the subject of the interaction is a controversial environmental issue, then the teacher may consciously or unconsciously be promulgating a particular political stance. For the students, this may mean they are unable to advance and defend a position on the issue that is authentically their own -- their own values held in respect of the issue remain submerged as they adopt the value position held by the teacher. For the teacher, the situation is risky because of his/her predisposition to charges of indoctrination. The chances of successful attainment of the socially-critical component of environmental education are diminished.

In summary, this section has sought to establish the contested nature of teaching activities in attempts to establish environmental education in the classroom. An interpretation of environmental education which emphasises the need for development of students' abilities in identifying and critically analysing the value positions at play in environmental issues in turn focuses attention on the relationship of habitual teaching activities to this development. The proposition was advanced that conventional information-imparting behaviours may contradict socially-critical environmental education; it

would also appear that such conventional behaviours would act to sustain interpretations of the innovation as "education about the environment". The role of teaching activities in environmental education is clearly an area requiring further classroom-level research.

4. Presuppositions about teaching and curriculum.

In Chapter 2 of this thesis, contesting views of the relationship between theory and practice were considered. One of those views -- which argued that the relationship between theory and practice is an intimate and dialectical one -- shapes how the general impression of environmental education practice presented in this chapter is construed.

Carr(68) argues that all educational practice is informed by an educational theory. He eschews the notion that theories and theorising are exclusively in the domain of academics and researchers, and that practitioners are technicians operating to apply academics' and researchers' theories as if their own practices were not informed by their own theories. He claims that "all practices have theory embedded in them", that "everyone engaged in educational pursuits...must already have some 'educational theory' in terms of which their activities are structured and their decisions are made", and that "teachers could no more teach without thinking (and hence 'theorising') about what they are doing than researchers could produce educational theories without engaging in the sort of practices distinctive to their activity".

The notion that personal practice is shaped by a personal theory which determines and is influenced by educational actions -- that is, a notion of a dialectical relationship between teachers' theory and teaching practice -- has also been articulated by Elliott and Adelman(69), and Henry(70). In explicating what he terms a "practical theory", Henry points out that

the educational theory which directly impinges on classroom practice, is the theory held in the minds of teachers, and which develops from the experience of teachers. This is the educational theory which specifies appropriate teaching behaviours and strategies in the context of the school and the classroom".

Put simply, then, the notion of "practical theory of teaching" suggests that teaching patterns are frequently determined by privately-held and often unexamined presuppositions about curriculum and classroom practice, and further that these presuppositions are the result of experience -- as a learner as well as a teacher; these presuppositions are the result of a socialisation process that is constantly being reinforced by the context of institutional education. To draw attention to these presuppositions when discussing environmental education is simply to particularise a general phenomenon: that the presuppositions associated with current practice necessarily become a relevant consideration in any curriculum innovation involving new patterns of curriculum and classroom practice(71). What, then, are the presuppositions which constitute a "practical theory of teaching", and what is the relationship between these

presuppositions and the characteristics of environmental education?

It has been claimed earlier in this Chapter that educational practices conducted in the name of environmental education, although contested, tend on the whole to express the non-politicised "education about and in the environment" rather than the socially-critical "education for the environment". There are pointers, found in practitioners' unselfconscious dialogue about their work, and in their practice itself, that presuppositions about curriculum and teaching are similarly contested.

Examples of contestation in presuppositions about curriculum and teaching can be found in the work of the GSCG reported in Chapter 5. The group was discussing the disciplinary quality of a new program in their school, the "Secondary History Education Project" (S.H.E.P.) and demonstrated contesting views of what is important about a discipline-based subject. As stated in section 5.1 of Chapter 5, two teachers were evaluating the program in terms of its knowledge content and viewed the disciplinary quality of the program in terms of substantive content. At different times, the teachers demonstrated their belief that the absence of a prime emphasis on factual knowledge constitutes a lack of disciplinary rigor, and their belief that a prime emphasis upon inquiry skill development constitutes a similar lack of disciplinary rigor. For one of these teachers, the S.H.E.P. program was not doing "anything in the slightest bit historical the whole time,

as long as it is inquiry-based". These comments reveal a view of "discipline" which values the substantive structures ("knowledge"; "content") and devalues the syntactic structures ("inquiry"; "skills"). Another teacher in the group was critical of this perspective.

On another occasion when the group was discussing the inter-disciplinary character of environmental education, one teacher made clear his assumption that conventional discipline-based subjects possess some greater inherent worthwhileness and purposefulness which is in danger of being sullied in some way by involvement in interdisciplinary work, such as "fringe subjects" like environmental education: "within science I think we can stretch the boundaries a bit but then you can't go off and do an historical analysis with any real justification under the umbrella of science...(There is a) moral obligation. You're there to teach science or teach geography and you can't draw on art and politics and all sorts of things to the fullest extent..."

Three members of the GSCG had, by the ninth meeting, been using the simulation game "Walmit Divided" in their environmental education teaching. "Walmit Divided" aims, through experiences in simulated environmental issues, to (in part):

foster the development of empathy and an awareness of human irrationality; develop the understanding of the dynamics inherent in decision-making processes(72).

These aims indicate an alignment with the "education for

the environment" dimension. One teacher elected not to use "Walmit Divided" because the end of term was approaching, and he felt he had to teach some geography to his students so that the material could be examined in a multi-choice test in order to supply marks towards the forthcoming term report. This illustrates the teacher's presuppositions about the primacy of disciplinary knowledge, primacy of "objective" propositional knowledge, his role as a teacher of teacher-selected information, and forms of testing and accountability.

From examples such as the above, from informal discussion and formal meetings with teachers, observations of teaching/learning situations, participation in inservice workshops and research groups in environmental education, and from questionnaire surveys and telephone interviews, it may be argued that there is a set of presuppositions about curriculum and teaching practice that are generally held -- which, though contested, tend to be predominant. These presuppositions are (73):

1. About knowledge in curriculum:

1.1 We obtain knowledge by an objective process of careful observation and insightful generalisations. These generalisations are useful in permitting us to predict future events, and thereby to develop some degree of technical control.

1.2 Worthwhile knowledge is neutral is the sense of being free or able to be freed from the subjectivity of human values.

1.3 Knowledge is naturally organised into certain

worthwhile fields or disciplines: discipline-based subject matter is of greater worth than holistic, integrated, opportunistic understandings.

1.4 the most worthwhile disciplinary knowledge is the factual, information (propositional) variety; this takes precedence over procedural knowledge (i.e. capabilities in process skills).

2. About teaching:

2.1 It is "teacherly" to be directive, in the sense of being responsible for the selection, organisation, and graded release of informational subject matter: in short, to behave as an authority-in-knowledge.

2.2 Appropriate sources of informational factual subject matter are texts or sourcebooks; in fact, a measure of the authority of certain subject matter is its inclusion in textbooks.

2.3 "Knowing" for the student means having information: "knowing" is demonstrated by reproduction of the language of the text or of the teacher in classroom discourse.

2.4 "Teaching" means to conduct a large-group, text-based, question and answer recitation (lecture and/or discussion).

2.5 "Schooling" is about school-oriented and citizenship-oriented socialisation: schooling serves a societal maintenance function.

It is contended here that these perceptions relating to presuppositions about curriculum and teaching contribute to an understanding of the present state of environmental education at the classroom level -- that the presuppositions cited above are a factor in the prevailing commitment to "education about the environment" at the expense of the development in practice of "education for the environment".

To put the contention at its simplest, "education about the environment" coheres closely with the presuppositions held by many individuals active in environmental education. Nature studies, so common in elementary schools, are practical activities which cohere with the view of knowledge that careful observations can produce an objective data-base from which emerge generalisable understandings about the environment. In environmental education at higher year levels, the practical involvement tends to be replaced with the provision to students of the generalisations themselves (for example, basic ecological principles), with this presentation of vicarious "truths" adding to the impressions of objectivity, absoluteness, and value-freedom. Information about the environment tends to be science-related(74), and thus is legitimised by virtue of its (science) disciplinarity. Furthermore, "education about the environment" tends to tap the substantive, propositional knowledge aspect of the (science) discipline -- that is, inquiry is minimal.

"Education about the environment" also coheres with

generally-held presuppositions about teaching. By virtue of its informational orientation, it lends itself to teacher direction in the form of selection, organisation, and gradual release. The information is gained, either by the teacher or directly by the students, from texts or other sourcebooks, rather than through student initiated and -directed inquiry. The teaching of such information is manageable within the context of conventional teaching, where the teacher acts as an authority-in-knowledge, drawing upon authoritative sourcebooks, and conducting large group question and answer discussions. "Education about the environment" coheres with presuppositions about "knowing": students demonstrate their knowledge (and hence the success of "education about the environment") by reproducing the language of the authority (teacher or text) in classroom discourse. Finally, and importantly, "education about the environment" coheres with the presupposition that schooling is about socialisation for social maintenance by encouraging the view that technical considerations are paramount in the resolution of environmental problems, and by neglecting the development of critical thinking about the subjective, value-laden, human element in environmental issues.

But what of "education for the environment?" What presuppositions about teaching and curriculum underpin this interpretation of environmental education? Henry(75) attempts to answer the above question and advances a tentative list of presuppositions about teaching and learning which he believes are consistent with "education

for the environment":

1. Worthwhile knowledge in environmental education programs is procedural knowledge, i.e., knowledge is 'capacity-to-do'.
2. The emphasis in the teaching of environmental education programs should be on the processes of problem solving/decision making, and the clarification of personal values.
3. Procedural knowledge and the processes therein are not constrained by discipline-based subject boundaries and therefore learning within environmental education should not be so constrained.
4. Awareness derived from tacit learnings, appreciations, feelings, sensitivities are deemed worthwhile, and should be integrated with more cognitively (consciously) acquired understandings of the environment.
5. Learning activities in environmental education programs should reflect the interests of the learners, be realistic and experimental. A significant proportion of these activities should focus on choice and action in a context which is within the action-horizon of the learners.
6. The learning milieu within environmental education programs is person-oriented. Emphasis is placed on developing a predisposition for active participation in environmental issues and on the acquisition of social values and concerns for the environment.
7. Learners are to be encouraged to develop independence of thought and personal autonomy in environmental matters.

There are obvious differences between this contesting set of presuppositions (suggested by Henry as underpinning "education for the environment") and those presuppositions previously advanced as being associated with current classroom practice. Key among the differences are the view of worthwhile knowledge as "procedural" rather than "propositional", critical rather than objective (in the sense that an emphasis on decision-making processes reveals the pervasiveness of values, in matters of practical human judgement, whereas an emphasis on careful observation creates impressions of the possibility of values-freedom), and unconstrained by disciplinary subject

boundaries rather than being so constrained. The key difference in the view of teaching relates to the relative importance of development of personal autonomy on the part of students.

These preceding paragraphs offer a partial explanation for the apparent preponderance of "education about the environment". The suggestion is that far from being "passive receivers" of imported curriculum materials, classroom practitioners possess an influential theoretical framework of their own, which is applied in appraising and implementing curriculum materials -- and further, that this theoretical framework is consistent with, or matches, only some of the objectives of environmental education, and is inconsistent with the conceptual underpinning of "education for the environment".

Finally, the proposition being advanced in this section is not only that a set of presuppositions exist in the minds of practitioners, and that these presuppositions are influential in determining the character of the innovation as expressed in the classroom, but also that the type of dissemination strategies typically invoked to promulgate the innovation do not take account of the existence and influence of these presuppositions. This is not a "teacher-deficit" proposition. It is a critique of the dominant view of innovation which fails to acknowledge the complexity of school-level contextual issues (such as the role of texts, disciplinary structures, habitual teaching activities, and the existence of teachers' educational

theories) confronting environmental education. It is, therefore, a critique of the organisation of environmental education. As long as this situation prevails, classroom-level practitioners have little choice but to interpret environmental education in a way which is a continuity of the status quo .

7.4 Environmental Education: Innovation Without Reform

It was argued in Chapter 6 that environmental education was intended as an educational reform -- that the socially-critical character of environmental education as described in the language of environmental education represents a challenge to existing patterns of curriculum and teaching(76).

Educational reform is, however, a problematic area. Differences in sensitivities and frames of reference, together with imprecisions of language, make it difficult to identify and describe change. Educational reform can be examined in two domains(77): in the public policy (language) domain, reforms are intended to produce a change in educational practices so that education will be improved; in the domain of process of converting principle and value to organisations and practices, new practices (innovations) represent practitioners' interpretations of what was intended by the reform. According to Cramer, the intention of reform creates an opportunity and climate for change, but the actual projects and practices introduced by practitioners constitute the process by which reform is

instituted.

This distinction between two domains of reform -- intention and process -- allows us to think of the possibility of the intention not being matched by the process. Cramer suggests that the notions of transformation and reproduction are useful in developing our understanding of the consequences of reform. She defines transformation as "the recognisable change witnessed as a result of innovation. The notion of transformation implies significant qualitative changes to organisations, ideas and practices. In transformation, new dimensions for interpreting and enacting educational processes emerge". Reproduction, on the other hand, "refers to situations where...initiatives fail to transform practices, where existing practices continue, or where new practices, organisations and ideas revert to established patterns because conditions do not allow the new ways to become established." This notion of the resistance offered by the structure and presuppositions of contexts to impending change is described by Popkewitz(78) as the "stability and resilience of institutional arrangements".

What, then, of the educational reform effort known as environmental education? Do educational practices enacted in the name of environmental education exemplify transformation, or reproduction?

As indicated earlier in this Chapter, the general

impression is that "education about and in the environment", rather than the socially-critical "education for the environment", is the predominant expression of environmental education. It has been argued, with supporting perspectives at international, national and local levels in Australia and overseas, that environmental education has not brought about significant and widespread qualitative change in classroom and teaching practices. Activities conducted in the name of environmental education contribute, in the main, to awareness-development and sensitisation objectives in the manner of conventional science, geography and nature studies activities. Such activities are "plugged into" existing programs in existing subject areas. Environmental education materials are used opportunistically rather than in a sustained, coherent program in their own right. Environmental education is accommodated into the existing curriculum structure:

It has also been shown that few programs in schools that have been claimed to be environmental education actually meet all the aims of environmental education. They are more concerned with education in and about the environment than education for the environment or social action. Thus it could be argued that environmental education has been subjected to incorporation into the existing hegemony in a neutralised form -- the radical 'action' components having been deleted and the less controversial knowledge and skills components retained, together with the name environmental education(79).

If claims that environmental education is accommodated or incorporated into existing curriculum and teaching patterns are valid, then it is serving to reinforce those patterns rather than to change them. The answer to the

earlier question, then, is that environmental education as an effort at educational reform exemplifies curriculum reproduction rather than curriculum transformation.

7.5 Summary and Conclusion

In this Chapter, it has been established that there are areas of contestation in the domain of educational practices in environmental education:

(i) between educational practices.

There are examples of "education about the environment" (for example, litter collection and classification), "education in the environment" (for example, interpretation and sensitisation activities), and "education for the environment" (for example, the investigation of controversial environmental issues such as proposed residential development near a fragile sand-dune ecosystem). While this contestation exists, educational practices tend to favor "education about the environment"; "education for the environment is the rarer form.

(ii) between the underlying epistemologies of these practices.

"Education about the environment" is informed by an empiricist view of knowledge; "education in the environment" is informed by a hermeneutic (subjectivist) view of knowledge; and "education for the environment" is informed by a post-empiricist view of knowledge.

(iii) between practices and language.

Educational practices in environmental education, while contested, favor the technicist "education about the environment", whereas the language of environmental education, while also contested, favors the socially-critical "education for the environment".

(iv) between practices and organisation.

For example, there is contestation between "education for the environment" and the technicist approach to educational change that places emphasis upon the production and dissemination of teaching materials as "ready-made solutions". There is also contestation between "education for the environment" and the view of environmental education as a form of science education, and between interdisciplinary environmental education and the disciplinary structure of curricula.

It was suggested that educational practices are shaped by the teaching materials in use (and by the view of educational change which justifies the use of materials as texts), by disciplinary structures in schools, by habitual patterns of teaching, and by practitioners' taken-for-granted presuppositions about teaching and curriculum. This points to a contradiction: the view of educational change which justifies the use of externally-produced materials as texts does not recognise practitioners' interpretive categories (~~pr~~^esuppositions about teaching and curriculum).

Educational practices in environmental education are contested. However, this contestation is of a different character to that discernible in the domain of language of environmental education: in the former, "education about the environment" is dominant; in the latter, "education for the environment" is preferred. In some cases, contesting views within the domain of practice, and between the domain of practice and the domain of language, are contradictory -- different practices, and the dominant practice and dominant language, are informed by conflicting epistemologies. These contradictions cannot be regarded as independent of the organisation of the environmental education movement. It remains to consider, in the light of contestation in language and practices, the role of organisation in this apparent reproduction of environmental education.

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6. Greenall, A. "Environmental Education: A Case Study in National Curriculum Action". Environmental Education & Information 1 (4): 285-294, 1981.
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8. Chapter 4 (section 4.4) presents an account of the evaluation of the Environmental Education Project materials.
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27. See UNESCO. Environmental education in the light of the Tbilisi conference. Paris: UNESCO, 1980.

28. See Robottom, I. (op. cit -- note 7).

29. Champeau, R. et al An assesment of teachers' understanding and use of "Goals for Curriculum Development in Environmental Education". In Sacks, A.B. et al (eds.) Current Issues VI: The Yearbook of Environmental Education & Environmental Studies. Columbus, Ohio: ERIC/SMEAC Information Centre, 1980.

30. UNESCO. "Progress, Trends & Prospects in Environmental Education". Connect VI (3):1-8, 1982.

31. See Chapter 4 of this dissertation.

32. See Robottom, I. (op. cit -- note 7). The teachers' comments are presented in Interview 11 in Section 3.9 of

the Report.

33. CDC. Exploring Outdoors. Canberra: Curriculum Development Centre, 1980.

34. CDC. Streets. Canberra: Curriculum Development Centre, 1980.

35. CDC. Environmental Education: A Sourcebook for Primary Education. Canberra: Curriculum Development Centre, 1981.

36. Robottom, I. (op. cit -- note 7): Interview 9.

37. Robottom, I. (op. cit -- note 7): Interview 7.

38. Robottom, I. (op. cit -- note 7): Interviews 8 & 9.

39. For an explication of the positivist view of education, see Chapter 2.

40. CDC. Investigating the National Estate. Canberra: Curriculum Development Centre, 1979.

41. The titles of the four Units give an indication as to the orientation of their contents:

Unit 1 : Investigating the National Estate;

Unit 2 : The National Estate -- The importance of aesthetics;

Unit 3 : The National Estate -- Investigating our historic & cultural surroundings;

Unit 4 : The National Estate -- Investigating our natural surroundings.

42. The Teachers Handbook describes the relationship between the respective units of the kit:

Unit One introduces the concept of the National Estate and discusses some of the processes and problems involved in identifying and managing the National Estate. Unit Two looks at the importance of aesthetics in deciding what should be part of the National Estate. Unit Three investigates our historic and cultural surroundings and fosters students' spirit of enquiry. Unit Four investigates our natural surroundings and promotes understanding of the importance of interdependence in the environment and the need to conserve our national heritage.

43. See Robottom, I. Report of a Study of Dissemination and Implementation of 'Investigating the National Estate'. Geelong, Victoria: Deakin University, 1981. This is a report of an evaluation sponsored by the Curriculum Development Centre, Canberra.

44. Siegel, H. "Kuhn & Schwab on Science Texts and the Goals of Science Education". Educational Theory 28 (4): 302-309.

45. Kuhn, T. The Structure of Scientific Revolutions. Second Edition Chicago: University of Chicago Press

(1970), and Kuhn, T. "The Function of Dogma in Scientific Research" in Crombie A.C. (ed.) Scientific Change. London: Heinemann, 1963.

46. Siegel, H. (op. cit -- see note 44).

47. Kuhn's critique of the influence of science texts on the development of critical thinking depends on his controversial analysis of science research traditions into "normal" and "revolutionary" science, as explicated in his book, The Structure of Scientific Revolutions. (op. cit -- see note 45). Whether or not Kuhn is correct in his analysis is not going to be disputed here. The point that the use of texts favouring "education about and in the environment" reinforces conventional patterns of schooling holds, and will be considered further in later sections of this chapter.

48. The four characteristics of the innovation as identified in UNESCO, Environmental Education in the light of the Tbilisi Conference, Paris: UNESCO (1980, are (a) a problem-solving approach; (b) an interdisciplinary educational approach; (c) integration of education into the community, and (d) a lifelong, forward-looking education.

49. UNESCO (op. cit -- see note 27.).

50. Tanner, D. & Tanner, L. Curriculum Development: Theory into Practice (second edition). New York: Macmillan, 1980.

51. See Robottom, I. (1983) (op. cit -- note 7) and Robottom, I. (1981) (op. cit -- note 43). Brief account of these two evaluation reports are presented in Chapter 4 of this dissertation.

52. See Robottom, I. (op. cit -- note 7).

53. Schoenfeld, C. & Disinger, J. (ed.) Environmental education in action. I: case studies of selected public school and public action programs. Columbus: ERIC/SMEAC, 1979.

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55. UNESCO. "Progress Trends & Prospects in Environmental Education" Connect VII (3):4, 1982.

56. See Robottom, I. (op. cit -- note 7).

57. UNESCO. (op. cit -- see note 55).

58. UNESCO. (op. cit -- see note 27).

59. This argument is developed further in Robottom, I.

"Science: A Limited Vehicle for Environmental Education?"
Australian Science Teachers Journal 29 (1): 27-31, 1983.

60. UNESCO (op. cit -- see note 27).

61. UNESCO (op. cit -- see note 27).

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71. See also Egan, K. "Some Presuppositions that Determine Curriculum Decisions". Journal of Curriculum Studies 10(2): 123-133, 1978.

72. C.D.C. Walmit Divided. Canberra: Curriculum Development Centre, 1980.

73. See also Robottom, I. "Why Not 'Education for the Environment'?" Australian Journal of Environmental Education 1 (1): 11-13, 1984.

74. Schoenfeld, C. & Disinger, J. (op. cit -- see note 53).

75. Henry, J. "Towards 'education for the environment'". Australian Journal of Environmental Education. 1(1): 14-16, 1984.

76. The Environmental Education Project (see Chapter 5) is a more specific concrete example of an effort at

educational reform.

77. Cramer, B. "A language for describing reform in education". In Three Discussion Papers (prepared for the Transition Education Case Studies Project, a project of the Deakin Institute for Studies in Education, Deakin University, Geelong, Victoria 3217). Melbourne: Transition Education Advisory Committee, 1983

78. Popkewitz, T. The Myth of Educational Reform. Wisconsin: University of Wisconsin Press, 1982.

79. This comment was made by Annette Greenall in reference to the outcomes of the Curriculum Development Centre's national Environmental Education Project, of which she was Project Coordinator. See Greenall, A. Environmental Education in Australia: Phenomenon of the Seventies -- A Case Study in National Curriculum Development. Canberra: Curriculum Development Centre, 1981.

CHAPTER 8: CONTESTATION AT THE LEVEL OF ORGANISATION:

TECHNOLOGISATION OF AN INNOVATION

A Message from Tbilisi

The problems of the environment are indeed complex ones. They involve numerous parameters and interrelations. Lacking the necessary knowledge and approaches, individuals admit defeat and hand the problems over to the specialists. It is in terms such as these that recourse to technocracy is frequently justified. The result is the abandonment of any attempt to involve ordinary people, who come to be regarded as mere operatives or consumers."

UNESCO. Environmental Education in the Light of the Tbilisi Conference. Paris: UNESCO, 1980.

8.1 Preamble

The previous Chapters in this Part have attempted to show that there is contestation at the level of language and at the level of educational practices. Different definitions, claims about intentions, and proffered guiding principles can be traced to conflicting views of knowledge, innovation, research and education. Similarly, different educational practices are justified by conflicting views of knowledge, innovation, research and education. Further, however, it has been argued that the language of environmental education, while contested in this way, tends to support a socially-critical orientation informed by a post-empiricist epistemology. On the other hand, educational practices, while again contested, show a strong tendency to adopt a technicist, non-socially-critical orientation informed by an empiricist epistemology. Thus the first two Chapters of this Part have been concerned with establishing (a) that contestation exists between different perspectives in language and practice, and (b) that there tends to be an

epistemological inconsistency between language and practice in environmental education.

This Chapter seeks to understand this inconsistency between language and practice in terms of the organisation of environmental education -- the models and strategies of educational change invoked in the administration of attempts to reach coherence between language (theory; policy) and classroom practice. As with the previous two Chapters, we will identify instances of contestation in the domain of organisation of environmental education to reveal the tensions and contradictions implicit in its contemporary forms -- tensions and contradictions rooted in the historical conditions and contemporary aspirations and circumstances of the environmental education movement.

8.2 Internationally

The flexible agenda and informal workshops of the Belgrade conference fostered a climate of creativity and volatility: the conference provided a forum for the interaction of competing views of "the environmental situation" and of appropriate educational responses (see Chapter 3). The discourse at Belgrade was marked by contestation and negotiation, some of which was captured in the Belgrade Charter itself.

Discussion documents tabled at the Tbilisi conference in 1977 included a number of suggestions and recommendations about the organisation of strategies for

the development of environmental education. It will be argued here that the form of organisation of environmental education recommended in these documents is inconsistent with the language (goals, intentions, guiding principles) also recommended at Tbilisi. The forms of organisation advocated (in curriculum development, dissemination and implementation, for example) conflict with the perspective implicit in the warning expressed in the Tbilisi quotation heading this Chapter.

The general form of organisation ultimately recommended at Tbilisi is managerial/hierarchical. In the UNESCO document Education and the Challenge of Environmental Problems(1), there are several recommendations about "strategies for the development of environmental education" which assume a rational, objectives-based view of educational change:

Strategies for the incorporation of environmental education in formal education should take into account the various components of the educational process, that is to say the objectives, content and methods, teaching materials, training of personnel and research and evaluation activities.

So far as objectives are concerned, those pertaining to the understanding and solving of environmental problems need to be clearly included among those of education in general, at all levels and in all sectors.

A particular effort will have to be made to prepare appropriate teaching materials and to train and retrain educators and enable them to introduce environmental education into their teaching.

These comments place great importance on the development of educational objectives and teaching materials. There is a view of educational research as fulfilling an

instrumental role:

It (is) necessary for research and evaluation activities relating to environmental education to be strengthened, so as to provide a scientific and experimental basis for innovations in this field.

Research and evaluation activities relating to environmental education... should provide useful guidelines for realigning approaches to the preparation of education and training programmes and for improving teaching materials.

While recommending that practitioners become involved in research, a notion of teachers as technicians carrying out instrumental-type research to test the effectiveness of activities and materials is conveyed:

another form of activity is of great importance, namely, the continuous qualitative and quantitative evaluation of environmental education activities with a view to constantly improving their efficiency and effectiveness. It ...seems particularly urgent for educators to receive not only general teacher training but also training in the devising of simple methods and instruments of research and evaluation enabling them to test, in the light of the objectives pursued, the effectiveness of the various components of the educational process (curricula, teaching materials, methods, etc.).

That the overall view of educational change recommended by the UNESCO program is a centre-periphery strategy, with the "Research, Development and Diffusion" characteristics (see Chapter 2) intact, is demonstrated in the following quotation from the same UNESCO document:

Emphasis has already been laid on the importance of research and experimentation with a view to the preparation of curricula, methods and material which corresponds to the demands of environmental education. In this connection, it seems necessary to undertake experimental projects which could serve as convincing examples to persuade the authorities, the teachers and the learners themselves of the possibility of developing interdisciplinary environmental

education with a view to the solution and prevention of immediate problems, and which would encourage the participation of the communities concerned. But such projects usually require large-scale technical support and specialised staff who are familiar with the experiments conducted in various countries; and, as many Member States do not have the necessary resources at their disposal, it is the role of international cooperation to stimulate the launching of such pilot projects. It would however be necessary to see that the cost and complexity of these projects do not prevent other countries from applying any useful lessons that may be drawn from them.

This quotation, appearing under the heading "Priority aspects of cooperation" is rich in indicators to the theory of social change informing the form of organisation advocated by UNESCO. There is a reiteration of an emphasis on curriculum materials produced in one site and designed, with the assistance of research and experimentation, to "be convincing", to "persuade", and to "encourage" other educators, learners and interested parties at other sites. Such projects, it is recognised, are cost- and labor-intensive, and require "specialized staff" -- they involve a division of labor between expert, knowledgeable developers and passive, persuadable practitioners. These are all characteristics of the RDDA model of educational change -- a model informed by an objective, empiricist epistemology(2) that conflicts with the post-empiricist epistemology of the socially-critical "education for the environment" also espoused by the UNESCO program. That is, there is evidence that the UNESCO language (theory; policy; goals; intentions; guiding principles) of environmental education is logically inconsistent with the organisation (strategies for development) also prescribed by UNESCO.

The form of organisation advocated by the UNESCO program is managerial/hierarchical. It creates a hierarchy of "managers" and "technicians"; the managers (academia, researchers, developers) set the language of the innovation and seek to control (by "persuading", or "convincing") the educational practice of the passive technicians. There is high status given to the language ("objectives" in the quotations above), which, once in place, provides those who are responsible for the organisation of the innovation with a set of directives with which to shape the practice of teachers. Given a managerial/ hierarchical form of organisation (as is the case in the prescriptions from UNESCO), control over language becomes translated into power over decision-making, resources and practices at other levels.

An example of a group of individuals controlling the language of environmental education was discussed in Chapter 6. Hungerford et al. (3) strongly defend their own formulation of the definition and aims of environmental education in a prominent international journal, actually admonishing the journal's editors for attempting to open up debate about the intentions and structure of environmental education. In a managerial/hierarchical form of organisation, such a bid for control over language is tantamount to a bid for control over teachers' practice. At a recent international environmental education conference, Iozzi(4) claimed "proven effective" status for a set of environmental education strategies. These

strategies are consonant with the language of the developers and have allegedly been "proved effective" relative to these goals by the type of instrumental educational research referred to in the UNESCO extracts cited above. But this leaves teachers with very little recourse in the event of difficulties being encountered in the implementation of the strategies. If they accept the "authoritative" language and the practices it apparently sanctions, teachers cannot engage the theory of the strategies (they are admonished if they query the goals of environmental education); nor can they claim that the materials are in some sense deficient or inappropriate to their setting, since the universal effectiveness of the materials is claimed to be "proven". The only remaining explanation is that the teachers themselves are in some sense deficient or incapable. These organisational notions of managed change, controlled knowledge (in the form of definitions and goals), teacher-proof materials, power hierarchies, and teacher-deficit explanations of innovation failure conflict strongly with statements elsewhere in UNESCO documents which point to the specific, context-dependent problems associated with socially-critical environmental education. (For example, under the heading "Some problems affecting the development of environmental development", the UNESCO document(5) speaks of problems emanating from attempts to teach interdisciplinary environmental education in a "framework of separate disciplines", the observation that "the adoption of a problem-oriented approach proper to environmental education is made difficult by the fact that

education overlooks the complexity of real life for theoretical, abstract studies", and a number of other "institutional problems").

8.3 Nationally

This section will discuss two recent examples of organisation of environmental education at the national level -- one in the U.S. and one in Australia. These two examples represent the "state of the art" in both countries": in Australia, the Curriculum Development Centre's Environmental Education Project (EEP) is this country's largest scale and most recent national environmental education effort(6); in the U.S., a document(7) tabled at the 1983 Environmental Education Congress (a national policy-making conference) was later accepted for publication in the national association's Monograph series(8) as a definitive statement of "new directions" for the association to undertake in the face of "challenges in the field"(9).

The case of the EEP was described in some detail in Chapter 4 (Section 4.5). CDC as the development agency harboured contesting interests: it wished to preserve a worthwhile central role in development of curriculum materials, while also recognising the importance of the school-based curriculum development movement(9). The development agency wished also to devolve responsibilities in materials development and dissemination "to the States", and as a consequence Project operations were

conducted by a team comprising representatives of the respective State education systems. These representatives were not closely involved in the negotiations and deliberations about the reform effort (about the innovation and appropriate curriculum responses) that took place at the "development agency" level of organisation over the previous four years. That is, a disjunction in discourse occurred with the consolidation of the Project team: the team inherited the terminology of the reform effort without having been party to the negotiations and discourse which shaped the particular agreed meaning of the reform.

It could be argued that the process of invoking and strengthening the role of existing systems in the Project by seconding education department representatives to act as key Project operatives is another example of contestation in the reform effort. The very fact that responsibilities were devolved to the State system level of organisation could be said to have legitimated their prior conventional modus operandi -- the Project team members were brought to the Project because they were representatives of networks with contacts and expertise in materials development and dissemination. Further, it is in the interests of systems representatives to continue to operate in conventional ways -- even in the "new" context of a reform effort. Systems representatives do have a certain expertise which is a function of, and relative to, the paradigm of their respective systems. It is in their interest in maintaining a comfortable "home" expertise not

to seriously change their views. In the context of Project operations, their views, conventional approaches, and hence expertise are sustained so long as extensive negotiation and discourse about the meaning of the reform (in particular, its socially-critical element) are avoided. Given the nature of the representatives' occupational paradigms, a technical interpretation of environmental education as "education about, and in the environment" removes the threat to "home" expertise.

The development agency was severely constrained in the extent to which it could contribute to dissemination of the innovation. As illustrated in Chapter 4, its activities in this area were restricted to the conventional dissemination strategies of advertising and promotion -- strategies effective in promoting sales but not tailored to the particular characteristics of the innovation. Responsibility in designing a set of "E.E.P.-specific" dissemination strategies was again devolved to the State education officer network level of organisation. Again, shortcomings in negotiation resulted in the invoking of conventional systems strategies for disseminating the innovation more as a "product" to be sold than as a set of problematic ideas, and which overlooked the potential disruptive resonances that the innovation might have with the structures and practices of institutional settings.

At the school administration and curriculum level of organisation the innovation encountered obstacles in the

form of conventional disciplinary structures.

Within-school diffusion of the materials of the innovation was influenced by the habitual sorting patterns of administrators (principals; teacher-librarians), who tend to react to the steady inflow of curricular materials by categorising them according to "subjects" -- subjects which like the curriculum committees which administer them, are disciplinary based. If the conventional curriculum is a jigsaw puzzle made up of subject "pieces", then environmental education as "education for the environment" may be a piece for a different puzzle altogether.

Ironically, the structure of the materials themselves contributes to their disciplinary tagging, and hence contests the interdisciplinary interpretation of the innovation. As described in Chapter 4 the materials comprise four publications which contain a "rhetoric of environmental education" and suggested practical activities. The rhetoric outlines four forms of environmental education ("education about, in, from and for the environment"), of which three (about, in and from) are conventional -- being concerned with awareness development, investigative skill development and sensitisation in a way which does not challenge existing institutional structures and practices -- and of which one (for) relates to socially-critical environmental education (concerned with the machinations of environmental decision-making and problem-solving). The last -- "education for the environment" -- is the

Project's stated preferred perspective. The activities included in the four publications are, however, more eclectic: two publications are clearly discipline-oriented and totally concerned with "education about the environment". Further, these two publications do not include the Project's preferred rhetoric of "education for the environment", and all four publications are separately available. Consequently, given the normal disciplinary structures in schools, and the associated sorting procedures habitually engaged in by administrators receiving ordered curriculum materials, it is to be expected that this type of publication, with its "subject appeal", would be perceived within a disciplinary framework from the moment it arrived in the school.

The structure of the materials is important because it mediates the way in which the reform acts as a "slogan system". The notion of "environmental education" is defined tightly enough in the rhetoric contained in the Primary Sourcebook, but the spirit of the reform is not concretised in the "practical activities" components of the materials -- and sales data reveal that the Primary Sourcebook (and hence the Project's rhetoric of environmental education) is not purchased by many of the schools using the materials(10). Thus, as a consequence of their structure, the E.E.P. materials can be used in situations characterised, on the one hand, by "education about and in the environment" and, on the other, by the absence of "education for the environment". The materials, and the name "environmental education", are used to

support "education about and in the environment" which is conventional in terms of its disciplinary structure, informational context, and teacher/pupil interactions. To interpret environmental education in this sense is to legitimate and continue the "stable state" of existing educational structures and practices -- reproduction rather than transformation.

The U.S. example concerns a recent sequence of events organised by the North American Association of Environmental Education. In August 1983, a conference entitled "The First National Congress for Environmental Education Futures: Policies and Practices" was held at the University of Vermont in Burlington, Vermont. One of the main objectives of the conference was to determine a national policy which could guide environmental education in the U.S. for the next several years. At a workshop of the Elementary/Secondary Section of the conference, a paper entitled "The Challenges of K-12 Environmental Education"(12) was tabled with a view to providing some structure and impetus to the policy-making discussions to follow. In 1985, substantially the same paper was published as one of three invited definitional papers "outlining new directives and challenges in the field" -- it was the only paper relating to Elementary and Secondary Education.

The paper begins by expressing concern about the current state of environmental education, claiming that "the year 1983 finds it, by and large, to be neither

pervasive nor very persuasive in the USA". The author cites a number of challenges for environmental education; the first is "accepting and focusing on the most appropriate goal for environmental education". The ultimate goal for Hungerford is "to provide an education which results in environmentally-affirmative citizenship". This he qualifies by citing that "environmental awareness instruction fails to develop effectively the ability to initiate environmental action", and claiming that "students must not only be knowledgeable about the environment, they must also have a set of skills which will permit them to function as change agents in society". Here Hungerford is making a case for the "ultimate goal" of environmental education to be understood as "education for the environment" rather than "education about the environment" -- a socially-critical perspective. Having suggested "the most appropriate goal", he reaffirms his earlier concern that "the ultimate goal of environmental education (is) either being ignored by practitioners or perceived as something that can be met through awareness education".

Hungerford's second challenge is "operationalizing environmental literacy: selecting appropriate goals". He cites as a problem that educational research has been only partially effective in identifying those "variables which influence behaviour". His comments indicate clearly that his view of educational research is an applied science (positivist) one, where the educational content is seen as a "system made up of discrete variables" which "influence

behaviour" in a "generalizeable" way. He says that

although researchers have investigated such variables as environmental sensitivity, knowledge of issues, beliefs, values, locus of control, and a number of population demographics, in none of the studies conducted thus far have they been able to account for a substantial amount of variance associated with behaviour in a manner that is generalizable to large segments of the population overall.

In a more prescriptive statement -- one which suggests that the type of educational research itself is not being viewed as problematic -- the paper maintains that "this is not to infer that said research is without merit -- it is simply a matter of noting that a great deal remains to be done with respect to identifying variables or groups of variables which will predict behaviour".

Despite pointing to the shortcomings of educational research in environmental education and urging that more of the same be done, the author does claim that "enough evidence exists to guide us in generating goals for instructional decision-making which permit us to predict outcomes with a high degree of confidence" and that "through this research, we have learned enough about environmental behaviour to be able to predict at least some of the elements which must be incorporated into instructional programs to make them successful". In the light of this research evidence, he recommends that a particular set of goals be accepted ("we must begin somewhere"). The set of goals he suggests the environmental education community accept is his own(13). These goals, which "have been⁸ validated against the 1977

Tbilisi Intergovernmental Conference on Environmental Education objectives", include elements suggestive of a socially-critical orientation, stressing a form of problem-solving which recognises that values are necessarily involved in environmental decision making. For example, one of the goals is "the ability to identify alternative solutions for discrete issues and the value perspectives associated with these solutions".

The third challenge is "taking the goals to the classroom". Having stated the need for consensus on goals, Hungerford cites Volk, Hungerford and Tomera(14) in posing five questions considered to be essential in addressing the issue of "taking the goals to the classroom:

1. To what extent is this goal important?
2. To what extent do existing curricula accomplish this goal?
3. To what extent is there a need for new curricula addressing this goal?
4. To what extent would new curricula addressing this goal be used by teachers?
5. To what extent would inservice teacher education be needed for new curricula addressing this goal?

Hungerford's acceptance that these are important questions relating to the operationalisation of his goals shows a positivist perspective on innovation: the process of educational change needs to be goals-oriented; these goals are determined independently of practitioners; change is materials-mediated; the notion of "inservice" is accepted as unproblematic.

The paper places central importance on the goals in its suggestions of how environmental education can be

improved:

"it seems obvious that unless developers of instructional materials and teacher trainers accept the goals and the research findings associated with the goals, not much will be accomplished. Unfortunately, both developers of curricula and professional educators have a propensity for making educational decisions on an intuitive rather than on an empirical basis..."

A power-coercive model of change is recommended -- one where change is imposed on the educational community by superordinate political/legislative systems: "The easiest strategy (for convincing teacher educators that they must train teachers for environmental education) would be to make such training mandatory in every state in the USA". For Hungerford, the only alternative to power-coercive strategies is to "hawk the goals and the need for their implementation at teacher educator conferences and to do so till the message is internalized". Beyond the "hawking of goals", a form of competency-based education is prescribed: "a major step in effecting this change (in teacher education) is the identification of those competencies needed by teachers which will enable them to become effective environmental educators". A list of these competencies is referred to: they were prepared by the same authors as the goals statements (Hungerford, Peyton and Wilke).

There is a contradiction embedded in these statements. The author deprecates the propensity of developers and educators for educational decision-making that is "intuitive" rather than "empirical". He also recommends a form of organisation in which developers and teacher

trainers (and therefore, presumably, teachers and students) accept as given the goals of environmental education determined by himself. However this form of organisation dissociates the "theory" of the innovation (this remaining the domain of the academy) from the practice (the work of practitioners), thus denying practitioners the opportunity to theorise about and research their own practice -- in short, to improve the rationality of their own practice -- and thereby actually perpetuating "intuitive" decision-making. To prescribe power-coercive models of change and to speak of "hawking the goals" until "the message is internalized" is to reduce the professional status of teachers to empty, passive recipients who must accept as an article of faith (that is, intuitively) the goals and embedded values of the goal-setting academy (in this case, Hungerford et al). These practitioners, to be "competent", must conform with criteria "fortunately" identified by the same authors.

In what sense is this recommended "new direction" for environmental education an example of contestation at the level of organisation? The author endorses a certain view of environmental education -- one which points to the limitations of "awareness development" and advocates "environmental action", seeing students as "change agents in society", and a search for the values embedded in environmental decision making. This socially-critical view of environmental education is predicated on a post-empiricist epistemology, one which reconciles knowledge, values and action. However, when he comes to

recommend an appropriate way of organising the innovation, the same author suggests a power-coercive, managerial/hierarchical approach and a continuation of a form of educational research that is clearly applied-science in nature, limiting teachers to the role of operatives in implementing the innovatory curriculum. These perspectives on innovation and educational research are informed by an empiricist epistemology. That is, the suggested organisation of environmental education is epistemologically inconsistent with the endorsed view of environmental education.

Thus, there are prominent examples at the national level in Australia and the U.S. of inconsistencies between language and organisation.

8.4 Locally

A number of examples of contestation at the level of local (school) administrative structures may be found in the "archival accounts" presented in Part II. In the "Investigating the National Estate" experience (section 4.3), probably the greatest barrier to sustained environmental education was the influence of the subject areas of the school curriculum. Contestation took the form of a debate based on "disciplinary parochialism", with participants attempting to ensure an adequate coverage of aspects of "their" subject area's content. The criterion for inclusion of material in a given educational program was whether justice was being done to the various subject

areas involved -- a criterion which conflicts with the interdisciplinary notion of environmental education.

The influence of a "subject oriented" structure on environmental education is also commented upon by participants in the School-based environmental education Project (see section 5.2). Ross and Sue in their final report to this project explain that

Social studies, Health, Science, Library, and Art follow set curriculums most of which are school based. They have specific grade level requirements which are expected to be followed, therefore the place of environmental education in such a subject oriented structure is one of isolation and is perceived this way by many of the staff.

Ross describes in some detail how the administrative structure of the school (in which he and Sue work) conflicts with their environmental education efforts:

From working through this project, Sue and I have from time to time encountered some significant problems that have restricted our progress with environmental education. The nature of the (composite) grade 5/6 area in which I work has been responsible for some of the most significant constraints encountered by us. To cater for the abilities of all children, we have ability groupings for mathematics and language four days per week. In actual practice I have no contact with my grade as a whole from 9:45 until 12:15 on these four days. On two of these days my grade has music and physical education from 9:15 until 9:45.. This means that from a possible 13 hours I only have contact with my grade as a whole for two hours during those four mornings. Friday mornings provide a 2.5 hour block, but existing commitments occupy this time and the two hours for the other 4 days. Afternoon sessions total 10 hours. This time is taken up by 2 hours of interschool sport on Friday. Team teaching of social studies takes 3 hours on Monday and Tuesday, Art for 1 hour on Wednesday and Science and Health takes 2 hours on Tuesdays and Wednesdays. This leaves 2 hours on Thursday, and in gaining this time, my grade does not see

"Behind the News" on a regular basis.

From this rigid timetabling structure come many problems. The main one that both Sue and I have been concerned with is the restriction of integration into other subject areas. We both have seen much potential for language, mathematics, science, health, and social studies related activities but we are severely limited in developing such opportunities due to lack of time with my grade as a whole.

We were able to gain extra time at various stages through our attempts to integrate environmental education activities into existing subject time slots. Friday mornings were occasionally used to further our activities. Justification for what we were doing in our minds was of an environmental education nature, but within our situation it had to be in subject boundary thinking as well.

This extended quotation shows that schools are subject to strong administrative structures -- in this example, ability grouping, specialist teaching, composite grades, team-teaching, and a disciplinary curriculum/subject-based timetable. While contesting views of education may be discerned in these structures, the overall effect is a fragmented curriculum which, in the definite views of the teachers concerned, conflicts with the notion of environmental education.

8.5 Technologisation of an Innovation

This Chapter has argued that while contested, the organisation of environmental education -- its strategy for educational change -- is predominantly managerial/hierarchical and technicist in character. It assumes that curriculum materials, if properly prepared, can function as effective change agents; it assumes that "experts" can bring pre-existing, positive "solutions" to

classroom practitioners; it assumes that "solutions" developed centrally have universal effectiveness; and the conventional dissemination strategy of simply informing the practitioner about the existence of the materials of the innovation presumes a "passive consumer" at the end of a delivery system. As the U.S. case exemplified, goals can be set, power-coercive or less legislative structures of "persuasion" can be invoked, teaching competencies determined, and instrumental research and evaluation conducted -- all with little or no recognition of, or attention to, the educational theories (sets of presuppositions about curriculum and teaching) of practitioners in schools. Fundamentally, organisational responses which tend to be adopted in respect of environmental education are based on a technicist assumption: educational change is assumed to be independent of the differences between the beliefs and justifications of the social context in which the innovation (its language and materials) is formulated, and those of the social context in which the innovation is to be realised as educational practices. The teacher's role is conceived as that of a technician implementing the goals and practices determined by others, and failure of the innovation is accounted for in "teacher-deficit" terms. For example Hungerford, lamenting low-level implementation of his goals for environmental education, writes

The writer observed long ago that there is a real difference between establishing goals for instruction on one hand and seeing those goals implemented on the other. The reasons for this discrepancy are many and frustrating and will not

be discussed here lest the writer be tempted to enter into a tirade of criticism on the educational community as a whole(15).

And in a Symposium on Environmental Education Research held at the North American Association for Environmental Education Annual Conference in 1982, Wilke and Leatherman claimed that research shows that

Teachers generally have good comprehension of what environmental education is and what its goals are, but however good these intentions, researchers and professionals have called into question the competence and ability of these teachers to accomplish the goals of environmental education(16).

The remainder of this Chapter will argue that teacher-deficit explanations of the failure of environmental education to meet its aspirations are ill-conceived -- that the presently dominant perspectives on educational change and research are responsible for so structuring "the innovation" that its operational form is incompetent to and incapable of meeting its socially-critical charter. A managerial/hierarchical form of organisation -- one informed by an empiricist, objectivist epistemology, and adopting an RDDA or similarly depoliticised, technicised view of educational change -- far from being, as claimed by its adherents on the basis of its objectivist epistemology, a neutral administrative process, is itself political. Its politics are the politics of preservation of the status quo, of reproduction.

Stability in the Face of Change

There are several instances in the experiences of the E.E.P.(see Chapter 4) which illustrate the reproduction potential of a technicist view of educational change. Perhaps the most fundamental is the invoking at all of a RDDA-type materials developmental model. The model itself shares a managerial/hierarchical outlook: it assumes "that a universal, logical and efficient procedure exists for the definition and organisation of change. It also suggests a neutrality to the change process itself: the problem of change is not to consider the moral/political structure of an institution but to implement a schema of order, precision and clarity"(17). According to Popkewitz, one of the technicist assumptions of the RDDA model is that "the discourse of change can be treated as independent of the institutional norms, beliefs and patterns in which the language is embedded". The E.E.P. experience provides clear instances of this assumption. The invoking of a loose grouping of systems representatives to operationalise a pre-existing and independently negotiated reform concept would seem to be based on the assumption that discourse about the reform concept can be continued from one context (the norms, beliefs and patterns of the central development agency) to another (those of the systems representatives). Dissemination strategies which treat the innovation as a product to be sold would seem to be based on the same assumption -- that value differences between the setting in which the innovation is formulated (that of the central

development agency) and the setting in which the innovation is implemented (schools) will not affect the reform effort. This assumption leads to a failure to engage the educational problems that arise in particular settings; those institutional constraints which shape educational practices remain unaddressed, and hence persist.

The pervasiveness of the technicist "world-view" in insitutional education, and its self-perpetuating quality, are well illustrated when the issue of interdisciplinarity is considered in relation to environmental education in general and the E.E.P. in particular. There is the argument that environmental education ought to be interdisciplinary. The feeling is that the excessive specialisation of analytic research traditions has bred socially-ignorant technicians -- individuals unaware of the social and environmental implications of their work, and hence ineffective agents in the resolution of (and perhaps even unwitting contributors to) a range of environmental problems. This specialisation of research traditions is seen as being matched by educational fragmentation characterised by discipline-oriented teaching and research(18). It is recognised that environmental problems are largely issues to do with "quality of life" -- they have a perceived "social need" component -- and that such problems cannot be resolved by the application of any single discipline. In response to these perceptions, part of the environmental education reform platform is an "interdisciplinarity" plank.

Statements ranging in origin from the Belgrade Charter to the E.E.P. include prescriptions for interdisciplinarity; the E.E.P.'s advocacy of "education for the environment" via an issues-oriented approach(19) is in line with Bernstein's claim that "to accomplish any of the more fundamental types of integration, as distinct from a number of disciplines focusing upon one particular problem, there must be a relational idea or a 'supra-context concept' which focuses upon general principles at a higher level of abstraction"(20). The paradox is, however, that the technicist and managerial character of the RDDA-based Project operations (little real negotiation with teachers in development, the involvement of systems representatives; emphasis on materials development; product-oriented dissemination strategies) directs attention away from the dynamics of the implementation setting in general and in particular away from the serious obstacles posed to interdisciplinary environmental education by disciplinary structures in schooling (as expressed, for example, in the prevalence of subject-oriented curricula) -- structures themselves legitimated by technicist thinking. Separately available E.E.P. materials concerned exclusively with "education about, in and from the environment" actually invite "symbolic" reform which reinforces the very structures and epistemology which opposes environmental education.

Ironically, the beliefs and justifications embedded in the implementation setting tend to offer reciprocal support to the technicist perspective on educational

change. For example, the tendency for schools to make extensive use of texts (as written; as "scripts for performance") reinforces the perspective that practical human problems (those of changing educational practices) can be solved by the application of a universally applicable set of "solutions" embodied in the textual product of an administrative process ("decisions" or "guidelines for action", for example). The discipline-centred curriculum implies a fragmentation of knowledge that is consistent with the specialised nature of technical processes in the wider community and, to the extent that environmental education is associated with the science discipline, an essentially technical scientific "world-view" is promulgated. Habitual patterns of teaching tend to treat the learner as a passive recipient of factual information, and to place the teacher in a position of authority (relative to the learner) in respect of knowledge(21), with administrative responsibilities in selecting and sequencing knowledge adjudged by the teacher to be worthwhile. Further, teachers possess definite views of teaching and curriculum which influence their actions(22); typically these presuppositions include a view of knowledge as objective, value-free and disciplinary, and a view of teaching as the didactic imparting of factual information(23). The preparedness of school administrators and practitioners to accept a curriculum from outside is itself an acknowledgement of readiness to adopt a role as recipient in a technological process -- to act as subordinate implementers, or in the words of Tbilisi, as "mere operatives or consumers"(24). These

presuppositions resonate sympathetically with the structural features of the implementation setting (subjects; timetables; specialist teachers) to sustain a technicist perspective.

Thus, in the case of environmental education, there is evidence of a symbiotic relationship in which conventional approaches to innovation, and the characteristics of the context where change is intended, interact to actively foster an interpretation of environmental education as "education about the environment", and conversely in which such an interpretation of environmental education legitimates the maintenance of existing organisational, teaching and curriculum patterns. That is, there is a dynamic relationship between the dominant perspective on innovation (as expressed in materials development and dissemination), institutional characteristics (patterns of teaching and curriculum) and a particular (technicist) interpretation of the innovation itself. In the case of environmental education, this dynamic is such that any factor which supports either "education about the environment" or existing patterns of organisation, teaching and curriculum operates to maintain the symbiotic balance of the interaction. This symbiotic balance may be understood as a dynamic stability in the face of change .

"Environmental Education" as a Slogan System

One factor maintaining the dynamic stability in the face of change is the generic (and perhaps equivocal and

ambiguous) nature of the term "environmental education". Environmental education has been defined in terms of three dimensions, "education in the environment", "education about the environment" and "education for the environment"(25). Interpretation of the innovation in terms of the first two dimensions enables the notion of "environmental education" to act as a slogan system: certain environment-related activities are used -- and environmental education is said to be happening because these activities are taking place -- in teaching/learning situations that are conventional in terms of their disciplinary structure, information content, and teacher/student interactions. These activities are recognised as being environmentally educational (their coherence with existing educational structures and practices fosters this interpretation); they are, however, not distinctively environmental education in the sense of "education for the environment". Of the three dimensions of environmental education, "education about the environment" is far more readily assimilated into existing structures and practices than "education for the environment". The generic nature of the term "environmental education" permits an equivocation about what will actually happen under the slogan (in, about, or for) and thus permits, if not encourages, change that is symbolic only.

The benefits of such a slogan system are several: the repertoire of candidate activities for existing disciplinary (usually science) programs is increased;

environment-related activities are used; timetabling problems are avoided; habitual teaching patterns are not threatened; the "host" program gains from whatever status and added attraction to funding bodies the label "environmental education" carries. On the other hand, to teach environmental education as "education about the environment" constitutes a change that is largely symbolic only -- at best representing a quantitative increase in the amount of environment-related work -- and reinforces such institutional characteristics as the subject basis of the curriculum and didactic teaching. The difficulty is that these characteristics act as barriers to the qualitative change defined as "education for the environment": the generic nature of the term "environmental education" becomes part of the problem that environmental education as an effort in educational reform seeks to address.

Reproduction and Transformation

As stated in Chapter 2, Thomas Popkewitz(26) presents a perspective on educational change which draws attention to the ideological character of schooling. He claims that beneath the surface layers of teaching and curriculum practice and structures, there are underlying principles of legitimacy, authority and social order -- a deeper ideology.

It was claimed in Chapter 7 that the dominant educational practices conducted in the name of

environmental education were of the "education about the environment" variety, and that these practices operated to conserve the existing structures and processes on institutional schooling. Environmental education reproduces, rather than transforms, the "surface layers" of teaching and curriculum. But what is being reproduced (reinforced and legitimated) when environmental education is interpreted as "education about the environment" runs deeper than the visible "surface layer" of structures (discipline-based subjects) and practices (conventional didactic teachings) in institutional education. As Popkewitz points out, what fundamentally is being reproduced is an entire view of knowledge and of social order.

The view of knowledge being reproduced in a dynamic relationship between the dominant perspective on the innovation process, institutional characteristics and the innovation itself is essentially technicist and has parallels in the distinguishing features of commonly-accepted conceptions of science. These features are:

1. Rationality: the assumption that there is only one rational method by which all problems can be solved. This notion further assumes that the nature of reality in the problem-solving context is known and understood, and that events are predictable. This assumption is reinforced by a view of innovation which fails to acknowledge the existence and influence of the norms,

beliefs and patterns of the institution where educational change is being sought. The commonly-accepted "rational method" of science -- that of advancement by empirical refutation of widely published and criticised truth-claims -- is reinforced by the tendency of environmental education as "education about the environment" to be accommodated within the structure of conventional science education.

2. Objectivity: the assumption that the only true understanding of a problem is one expressed in terms of factual information. The implication of empiricist models is that scientific knowledge, by virtue of the rigour of its rational method of its generation, is separable from, and has primacy over, such "metaphysical" matters as human values and interests. Again, this notion is reinforced by conventional views of innovation which fail to recognise the different sets of values in the implementation setting, and by the association of environmental education with the "science" subject in the curriculum. The importance of factual information to understanding of problems is reinforced by didactic methods of teaching which stress the importance of imparted information.

3. Truth: the proposition that for every genuine question there is only one true answer. This follows from the conception of a scientific community as an "open society" in which proffered truth-claims receive widespread criticism. The notion of "truth" is

consistent with the view that empirical refutation of old theories is followed by the formulation of new ones in a progressive march away from uncertainty. In the case of environmental education, the "one true answer" assumption becomes interpreted as "only one best solution exists for each environmental problem" -- an assumption reinforced by the tendency in science education to stress technical (rather than, for example, practical) solutions to problems, and by didactic teaching patterns which establish the teachers' solutions as the only ones of consequence. The view of innovation which implies the universal applicability of centrally-produced curriculum materials (as solutions to the problems teachers wrestle with in environmental education) also supports this assumption.

The view of social order reproduced by the tripartite, hegemonic relationship between the dominant perspective on innovation as a process, existing institutional patterns and a technicist interpretation of the innovation is closely tied to the epistemological considerations expressed above. The learner's context is one which knowledge is fragmented, selected and sequenced by other individuals who are "in authority". The teachers are authorities not only with respect to knowledge, but usually with respect to school and classroom management as well. The learner, then, is treated as a relatively passive, receptive individual whose knowledge and perspectives are shaped over time by the authority figure. This setting leads to a political theory: the individual

is denied the role of actor in the creation of history and culture(27). This view of social order is antipathetic to the learning autonomy and responsibility sought in "education for the environment".

Technologisation: Countering the Socially-Critical Edge of Environmental Education

In a recent article in which he discusses "the technologisation of reason", Kemmis deprecates "our willingness to subjugate our human, convivial intelligence and capacity for critical thought to technologies of reason". He expresses a concern remarkably similar to the warning from Tbilisi cited at the head of this Chapter. Kemmis claims that

in a world dominated by contending specialisms, arcane technologies and the proliferation of mass solutions to practical problems, we seem all too ready to give up our own critical intelligence and to accept as the solutions of our own problems the forms of life fashioned for us by others -- where those "others" are "experts", "specialists" or...the technologists of reason(28).

It has earlier been contended that environmental education is being systematically "technologised" to the point where its operational form fails to meet its socially-critical charter. It is further contended here that the presently dominant technicist perspective on innovation which informs the organisation of environmental education is part of the machinery that supports this "technologisation" and thus undermines the socially-critical aspirations of environmental education.

By conserving and reproducing a technicist view of the world -- one whose principal pivots are rationality, objectivity, truth and control -- environmental education as "education about the environment" creates the impression that environmental problems are susceptible to resolution through technical, applied-science means. The view is promulgated that a "logic of issues resolution" exists, based on such elements as fragmentation (through a division of knowledge into specialisms concretised in a division of labour between specialists and non-specialists), means-end thinking, eradication of values, and large-scale administrative and financial support. The impression is that, given sufficient time and knowledge acquisition in respect of an environmental issue, an appropriate course of action will emerge, and the single best solution be attained. Ironically, these deeper and "hidden" impressions interact with more tangible institutional constraints to result in a situation in which teachers and students rarely progress from an "awareness development" phase into the "action" or participation phase prescribed in commonly-accepted guiding principles of environmental education.

The technicist world-view promulgated in "education about the environment" disregards the important qualitative dimensions of that majority of environmental issues which involve "quality of life" or "social need" concerns -- emotions, beliefs, aspirations, aesthetics and, perhaps most important of all, vested-interest

political factors. It could be argued that a view of environmental issue resolution which stresses the role of technical "machinery" (in short, the processes of an objective, applied science method) in dealing with environmental issues succeeds in creating a false impression of the way in which these issues are resolved by masking such value-laden political machinations as negotiation, manoeuvring, persuasion, the offer of inducements, the exertion of influence, and so on. This false impression of the decision-making processes associated with the resolution of environmental issues creates the conditions for the intrusion of unaccounted vested interests in those processes -- conditions which improve the possibility of excessive exploitation of the environment.

The quotation at the beginning of this section refers to the technologisation of reason -- our apparent preparedness to surrender our capacities for critical thought in the light of expanding technologies. Environmental education as "education for the environment" aims at the development of reason, of critical thought about the values informing contending proposals for action. The proposition being advanced in this chapter is that this particular innovation is being technologised principally by the technicist perspective on innovation which "education about the environment" expresses, to the extent that the innovation itself is contributing to the very problems it seeks to address. As presently organised, environmental education conserves extant institutional

conditions (disciplinary structures; didactic teacher-student interactions; overall, a technicist "view of the world"), which in turn reflects and serves to sustain particular social values and interests in the larger social/cultural community.

8.6 Conclusion

The focus of this Chapter has been the organisation of environmental education. The propositions advanced in this Chapter are:

(i) The dominant perspective on innovation is technicist. It interacts with institutional characteristics and popular interpretations of environmental education to form an hegemony, confronting attempts at educational reform with a dynamic stability in the face of change. This hegemony is hostile to socially-critical education. Organisational strategies informed by the dominant view of innovation ("imported" goals; little discourse with practitioners; power-coercive measures; teacher competencies; instrumental research and evaluation) amount to a means of "control" over practitioners, who as a consequence lack the autonomy and responsibility to challenge the dynamic stability resisting environmental education as "education for the environment".

(ii) In addition to continuing the "surface features" of institutional structures and practices, the dominant perspective reproduces an entire view of knowledge and of social order. While assuming the trappings of

neutrality by virtue of its objectivist epistemology, it reproduces rather than transforms the social conditions which pose threats to the environment, and the forms of education which preserve rather than challenge critical consciousness about these problems.

(iii) Of the perspectives on innovation outlined in Chapter 2, only that of Popkewitz is built on the notion of ideology critique and is therefore capable of offering a coherent account of the technologisation of the innovation.

NOTES

1. UNESCO. Education and the Challenge of Environmental Problems (UNESCO/UNVED 4). Paris: UNESCO, 1977.
2. See Chapter 2 for a discussion of the epistemology of the RDDA perspective on innovation.
3. Hungerford, H. et al "Yes, EE Does Have Definition and Structure". Journal of Environmental Education 14(3):1-2, 1983.
4. Iozzi, L. "Science, Technology, Society: Dealing with Conflict Issues in Elementary and Secondary Schools". Paper presented at the 13th Annual Conference of the North American Association for Environmental Education: "International Perspectives on Environmental Education: Issues and Actions". Chateau Lake Louise: Alberta, Canada. 5-9 October, 1984.
5. UNESCO (op. cit -- see note 1).
6. For a brief account of an evaluation of this Project, see Chapter 4. For the complete version, of which this section 8.3 is an extract, see Robottom, I. Environmental Education Project: Evaluation Report. Curriculum Development Centre, Canberra/Deakin University, Geelong: 1983.
7. Hungerford, H. "The Challenges of K-12 Environmental education". A paper prepared for The First National Congress for Environmental Education Futures: Policies and Practices. Burlington, Vermont: University of Vermont, August, 1983.
8. North American Association for Environmental Education. Monographs in Environmental Education and Environmental Studies. Columbus, Ohio: ERIC.
9. Sacks, A. "NAEE: New Monograph Series". The Biosphere: Newsletter for the International Society for Environmental Education 1:3, Winter, 1985.
10. See Chapter 4, section 4.5.
11. Op. cit -- see note (9).
12. Hungerford, H. (op. cit -- see note 7).
13. Hungerford, H.; Peyton, R. and Wilke, R. "Goals for curriculum development in environmental education". Journal of Environmental Education. 13 (1):24-27, 1981.
14. Volk, T.; Hungerford, H.; and Tomera, A. A national survey of curriculum needs as perceived by professional environmental educators. Unpublished research document. Southern Illinois University at Carbondale, 1983.
15. Hungerford, H. (op. cit -- see note 7).

16. Wilke, R. and Leatherman, J. "Conclusions and generalisations drawn from Research in Environmental Education 1971-1980 regarding: Teacher training preservice, teacher training inservice, community resource use and field trips". Stevens Point, Wisconsin: University of Wisconsin - Stevens Point. Mimeograph, 1982.

17. Popkewitz, T. "Change and stability in schooling: The dual quality of educational reform". Wisconsin: University of Madison - Wisconsin. Mimeograph, 1982.

18. See Smolicz, J. "Fragmentation in Science and Education: an analysis of the community structure of science". In Murray-Smith, S.(ed) Melbourne Studies in Education 1974. Melbourne University Press, 1974.

19. See Womersley, J. and Stokes, D. "Environmental Education: A Conceptual Framework". In C.D.C. Environmental Education: A Sourcebook for Primary Education. Canberra: Curriculum Development Centre, 1981.

20. Bernstein, B. "On the classification and framing of educational knowledge". In Young, M.F.D.(ed). Knowledge and Control. London: Collier Macmillan, 1971.

21. Henry, J. "Inquiry Teaching: A Failed Innovation?" A talk to the Catholic Teachers' Association of Victoria, Melbourne, 1980.

22. See, for example:

(a) Elliott, A. and Adelman, C. "Innovation at the classroom level". In Innovation, the School and the Teacher. Wilton Hall, Milton Keynes: The Open University, 1976.

(b) Henry, J. "Teachers as Researchers: a redefinition of the theory/practice gap". Paper presented at the Annual Conference of the Australian Association for Research in Education, Adelaide, 1981.

23. The background to this assertion is provided in Chapter 7 ("Presuppositions about teaching and curriculum").

24. See the quotation heading this Chapter.

25. For a discussion of the definition, aims, and interpretations of environmental education, see Chapter 6.

26. Popkewitz, T. (op. cit -- see note 17).

27. Popkewitz, T. (op. cit -- see note 17).

28. Kemmis, S. "Program evaluation in distance teaching: against the technologisation of reason". In Armstrong, J. and Store, R. (eds.). Education in Distance Teaching. Proceedings of the National Workshop on Distance Teaching sponsored by Townsville College of Advanced Education in co-operation with the Australian and South Pacific External Studies Association, Townsville, May 11-14, 1980.

PART IV: ENVIRONMENTAL EDUCATION AND EDUCATIONAL RESEARCH

CHAPTER 9: ENVIRONMENTAL EDUCATION AS AN EDUCATIONAL PROBLEM

Part III of this dissertation sought to draw attention to contestation in environmental education. Chapter 6 argued that, though contested, the dominant conception of environmental education expressed in the language at international level was a socially-critical one favoring "education for the environment". Chapter 7 proposed that, though contested, the dominant form of educational practice at the local (school) level was not socially-critical, and in fact favored "education about and in the environment". Chapter 8 implicated the way environmental education is organised -- its model and strategies of educational change -- in this apparent dissonance, claiming that organisation of environmental education is inconsistent with the rhetoric of "education for the environment", but, despite its reformist zeal, consistent with the reproductive character of schooling. It was argued that in the case of environmental education, a dynamic stability in the face of change is established through an hegemonic interaction between the dominant view of education, institutional features, and a certain interpretation of environmental education. Specifically, centre-periphery (technicist) approaches to innovation, conventional didactic teaching and disciplinary curriculum practices, and interpretations of environmental education as "education about the environment seem to interact

sybiotically -- to reinforce each other in a way which resists authentic educational reform, and contributes to continuity of "education about the environment".

It is proposed here that there is a two-fold educational problem for environmental education. Put simply, it is the apparent continuity of educational practice in what is espoused as an educational reform, and the role of an incompatible form of organisation in maintaining this continuity.

9.1 A Conventional Construction of the Educational Problem of Environmental Education

In the terms of the conventional (RDDA-type) understanding of educational reform, the educational problem of continuity in environmental education practices is construed as a "rhetoric/reality gap". The "rhetoric" is the language or theory of the academy -- the policy statements validated by educational researchers and legitimised at international conferences (in the case of environmental education, this originally took place at Belgrade and Tbilisi). The "reality" is the educational practices of teachers at the school level. The appropriateness of the RDDA form of organisation is taken for granted: the subversive role of organisational strategies in aiding and abetting the continuity of existing processes and structures is not recognised. Conventional research of the instrumental kind tackles the problem of how to bring the practice of teachers in line

with the theory of the academy. Actions are based on the empiricist/objectivist assumption(1) that research findings represent a type of knowledge that can be applied by teachers as "solutions" at other sites. "Educational theory" is understood as residing in the language of researchers in the academy; teachers are understood as being in some sense "atheoretical" and their activities as being in some sense purely practical. Thus perceived, this educational problem gives rise to "deficit theories of teachers", in which practitioners are seen as being unwilling or unable to understand or translate into practice the findings of researchers. The proposition being advanced here is that this view of the educational problem of environmental education, embodying a dichotomised view of the relationship of theory and practice and informed by an empiricist/objectivist epistemology, is incapable of offering a coherent account of the contestation and conflicts within and between language, organisation and practice.

9.2 A Reconstruction of the Educational Problem of Environmental Education

It was suggested in Chapter 7 of this thesis that a factor affecting education practices in environmental education was the set of presuppositions about knowledge, curriculum and teaching held by practitioners. The proposition that practitioners, far from being "atheoretical", have theoretical views which guide their practice underpins a reconstruction of what counts as an

"educational problem".

Carr(2) contends that "it is difficult to know how any teacher could ever undertake any educational practice without some knowledge and understanding of the situation in which he is operating and some idea of what it is that needs to be done". He goes on to claim that "everyone engaged in educational pursuits...must already have some 'educational theory' in terms of which their activities are structured and their decisions are made". This personal-dialectical view of the relation of theory and practice is clearly opposed to the RDDA view that theory is the domain of the researcher and practice the domain of the teacher. Carr's view of the relationship of theory and practice in educational research is captured in his statement that:

It is...somewhat misguided to regard research and teaching as, respectively, the 'theory' and the 'practice' of education. They are both theory-guided practices, each of which may be undertaken with varying degrees of intelligence and success. The twin assumptions that educational research is non-practical and educational practice is non-theoretical are, therefore, entirely misleading. All practices have 'theory' embedded in them and this is just as true for the practice of 'theoretical' pursuits like educational research as it is for practical pursuits like teaching. Teachers could no more teach without thinking (and hence 'theorising') about what they are doing than researchers could produce educational theories without engaging in the sort of practices distinctive to their activity".

According to Carr, the conventional conception of what constitutes an educational problem distorts the relationship of theory and practice in three ways:

(Firstly,) to regard theory-practice gaps as problems of 'communication' or 'implementation' that are peculiar to practical activities like education, distorts the fact that a gap between theory and practice is the kind of difficulty that can also occur in the course of any theoretical undertaking. Secondly, the assumption that these difficulties can somehow be identified and tackled 'in theory' and then 'applied' in practice tends to conceal how they are, in fact, generated out of the experience of practitioners and only emerge when the way in which these experiences are usually organised is found to be ineffective. Thirdly, the view that the problems that these gaps create can be overcome by converting theoretical knowledge into rules of action overlooks the simple point that gaps between theory and practice, whether they occur for researchers or teachers, are closed by the practitioners themselves formulating decisions in the light of the framework of understanding that they already possess.

To paraphrase briefly, Carr's perspective on theory and practice is that:

- * educational problems are constituted of gaps between theory and practice;
- * everyone engaged in educational pursuits possesses an educational theory;
- * anyone engaged in educational pursuits may therefore experience the difficulties of a theory-practice gap;
- * theory-practice gaps -- and the educational problems they constitute -- only emerge from the experiences of practitioners;
- * equally, theory-practice gaps can be closed only by practitioners themselves -- through a process of critical appraisal of the respective adequacies of their own educational practices and their own educational theories (those beliefs and assumptions in terms of which the practices are made intelligible).

In light of this perspective on theory and practice, the

conventional explication of the educational problem of environmental education -- one conventionally expressed in terms of a gap between international language and local classroom practice -- is dangerously simplistic. It is "simplistic" because it fails to recognise that "everyone engaged in educational pursuits possesses an educational theory" and thereby overlooks the possibility of theory-practice gaps existing within the activities of international conferences, national curriculum projects, and school programs. It is "dangerous" because it fails to countenance the possibility of subversive contradictions at the level of organisation.

If the relationship between theory and practice is understood in the way explicated by Carr, it becomes possible to offer a reconstruction of the educational problem of environmental education. As Chapters 6,7 and 8 sought to establish, there are examples of contestation in language, organisation and practice at international, national, and local levels of environmental education. That is, multiple perspectives emerge in discourse about policy, change strategies and teaching, as well as in actual administrative and educational practices conducted in the name of environmental education. In a diverse and liberal society, this is, of course, to be expected. However some of these contesting perspectives are clearly based on conflicting views of knowledge, innovation, research and evaluation, and education -- these perspectives are inconsistent. So the problem of environmental education can be seen, not as a case of

practitioners' inability to translate the theory of the (international) academy into (classroom) practice, but as a series of theory-practice gaps at all levels of environmental education activities. In accord with Carr's explication of theory and practice, the educational problem of environmental education is "educational" if the "theory" it refers to is the theory (beliefs and assumptions) held by individuals and in terms of which those individuals understand their educational practice. And it is a "problem" if there are dissonances between personal theory and personal practice, or between these and the structure and relations of the social setting in which educational practices occur. Put another way, the educational problem of environmental education is continuing irrationality at all levels of environmental education activities, where "irrationality" is the persistence of personal theory-practice gaps through a lack of conscious, critical self-appraisal of "the adequacy of the concepts, beliefs, assumptions, and values incorporated in prevailing theories of educational practice".

In Chapter 8, the notion of technologisation was invoked to describe the subordination of practitioners' rationality (or "critical intelligence") that occurs when the "solutions" of outside experts are proffered and accepted in technicist forms of organisation. The "technologisation of reason" accompanying the conventional, technicist form of organisation of environmental education obscures questions such as those

about the value of ends or the values intrinsic to educational processes and practices, taking these for granted and rendering them unproblematic, thus weakening the capacity of practitioners to critically appraise their theories and practices, contributing to irrationality. In the case of environmental education, continued irrationality enables the persistence of a dynamic stability in the face of reform -- a case of contestation and continuity.

If the problem of environmental education is reconstructed and understood in a way which emphasises a theory-practice dialectic at all levels of environmental education, some pointers emerge to the kind of activities that might succeed in breaking the hegemony of the dynamic stability described in Chapter 8, with the possible outcome of sustained qualitative change in educational practices in general and environmental education in particular. In the words of Carr(3):

If...it is recognised that there is nothing to which the phrase 'educational theory' can coherently refer other than to the theory that actually guides educational practices, then it becomes apparent that a theoretical activity explicitly concerned to influence educational practice can only do so if it influences the 'theory' in terms of which these practices are made intelligible. 'Educational theory', on this view, is not an 'applied theory' that draws on theories from philosophy and the social sciences, but rather refers to the whole enterprise of critically appraising the adequacy of the concepts, beliefs, assumptions and values incorporated in prevailing theories of educational practice. This does not mean that the relationship of theory to practice is such that theory 'implies' practice, or is 'derived' from practice or even 'reflects' practice. Rather, by subjecting the beliefs and justifications of existing and ongoing practical traditions to

rational criticism, theory transforms practice by transforming the ways in which practice is experienced and understood. The transition is not, therefore, from theory to practice as such, but rather from irrationality to rationality, from ignorance and habit to knowledge and reflection.

This interpretation of "educational theory" as rational criticism of the relationship of theory and practice is coherent with the nature of the educational problem of environmental education. Its epistemology is dialectical: it sees knowledge as an interplay of the individual's subjective views and the social, cultural, historical and environmental context in which the individual lives. That is, knowledge is an interplay of practitioner's guiding theories and personal and institutional practices. "Theorising" about (critical appraisal of) such theory and practice is emancipatory, aiming at "freeing practitioners from personal and situational habits, mystifications and compulsions"(4) -- in the case of environmental education, such "theorising" represents a coherent antidote to technologisation of the innovation. Further, the epistemology of this interpretation of "educational theory" is coherent with the epistemology of the substantive character of environmental education: the same post-empiricist view of knowledge informing the ideological perspective on educational change also informs environmental education as a socially-critical endeavour.

In summary, this Chapter, in attempting to reconstruct the educational problem of environmental education, has proposed that:

* The present state of environmental education, although

one of contestation, is also one of continuity of educational practice -- a continuity maintained by the "technologising" influence of existing technicist forms of organisation.

* Conventional constructions of this situation are in terms of a large-scale theory-practice gap, where the "theory" is the language and policy of the international academy, and the "practice" is classroom teaching. This is a distorted view of the relationship of theory and practice which diverts attention away from the manner in which environmental education is organised, and diminishes the perceived need for practitioners to exercise their critical intelligence: the innovation is "technologised". ("Technologisation" is a form of continuing irrationality, where contradictions are maintained in the absence of critical appraisal of personal theory and practice, and of the hegemony or dynamic stability resisting qualitative change).

* A coherent construction is that the educational problem of environmental education comprises a series of theory-practice gaps at all levels, where "theory" is the set of beliefs and assumptions held by individual practitioners, and in terms of which they understand their educational practice. An educational problem exists because these theory-practice gaps exist; the educational problem continues because these theory-practice gaps exist unacknowledged within the organisational infrastructure of environmental education. They are at once maintained and denied by a distorted view of "educational theory".

- * A coherent interpretation of "educational theory" sees it as rational criticism (by those engaged in educational pursuits) of the relationship between theory, practice and circumstance. Its dialectical epistemology acknowledges practitioners' interpretive categories and the interactive relationship of these categories on the one hand, and personal and institutional practices on the other. By encouraging critique, its interests are emancipatory. Educational theorising is an antidote to technologisation.
- * The epistemology of this construction of the educational problem of environmental education is post-empiricist, and therefore is consistent with that of socially-critical environmental education.

In light of the above comments, the research question of "How may environmental education be improved?" (or "How can we resolve the educational problem of environmental education?") becomes "How can we improve educational theorising in environmental education?" Chapter 10 is concerned with establishing the potential of alternative forms of educational research for adequate theorising in environmental education.

NOTES

1. The empiricist conception of scientific knowledge is discussed in Chapter 2 (section 2.1). The RDDA view of educational change, which is informed by an empiricist epistemology, is outlined in section 2.2.
2. Carr, W. "Educational research as science". Victoria, Geelong: Deakin University, 1980.
3. Carr, W. (op. cit -- see note 2).
4. See "framework for critique", Chapter 2, section 2.5.

CHAPTER 10: IN SEARCH OF A FORM OF EDUCATIONAL RESEARCH
COHERENT WITH THE ASPIRATIONS OF EDUCATION FOR THE
ENVIRONMENT

The intention in this Chapter is to consider three forms of educational research (see Chapter 2) in terms of their capacity to address, and support critical analysis of, the educational problem of environmental education. Forms of educational research may be said to be coherent with environmental education when they permit such critical analysis in terms comprehensible within a theory of environmental education itself. To be coherent in its own terms, an appropriate form of educational research must possess a number of qualities:

- * in the light of Chapter 6, it must be consistent with a socially-critical view of environmental problems -- one which seeks to appraise environmental actions in terms of their historical and social contexts.
- * in the light of Chapters 6 and 7, it must recognise the interpretive categories of practitioners -- their "presuppositions about teaching and curriculum".
- * in the light of Chapter 8, it must recognise the technologising effect of the hegemony ("dynamic stability") between the dominant view of educational change, institutional structures, and technicist expressions of the innovation.
- * In the light of Chapter 9, it must construe the educational problem of environmental education as constituted of discrepancies between individual theory and practice (false consciousness), and between

individual theory and practice on the one hand and social structures and relations on the other (hegemony).

* Again in the light of Chapter 9, it must provide a means for closing individual and individual/social theory-practice gaps. In other words, it must concern itself with educational theorising as ideology-critique -- it must address ideology as both false consciousness and hegemony.

The three forms of educational research considered here will be the positivist, interpretive, and critical approaches outlined in Chapter 2. Since these three approaches were adequately described in Chapter 2, their treatment in this Chapter will be a critique of their resonances with environmental education in particular -- that is, of their potential for theorising in environmental education.

10.1 Positivist Approaches to Educational Research and Evaluation: A Critique of the "State of the Art"

The approach in this section will be to establish the form of positivist approaches to research and evaluation in environmental education by discussing a seminal "trend paper" in the field -- a paper presented at the 1975 Belgrade Workshop on Environmental Education as a comment on the "state of the art". This will provide a concrete example on which to base a critique.

Two points need to be registered before beginning. The

statement considered here was written in 1975; while there is no reason to doubt that it was an accurate "state of the art" statement for the field of environmental education, and was also a fair representation of dominant evaluation strategies in the field of curriculum evaluation, it should be pointed out that the latter field was in a state of considerable turmoil at the time(1). Thus while there is evidence(2) that the statement could still (in 1985) be taken as representing the current "state of the art" in the field of environmental education evaluation, it is fair to say that it may now not have this status in the field of educational evaluation. Notwithstanding these comments, the paper was written in the belief that it would be influential in shaping thought about how environmental education ought to be evaluated, and hence is open to critique.

The paper to be considered is Dean Bennett's "The Evaluation of Environmental Education Learning"(3), written, as mentioned earlier, as a "trend paper" to focus discussion at the Belgrade Workshop on Environmental Education(4). Bennett makes it clear that his model prescribes evaluation for decision-making: "the synthesized model presented here is a decision-making one". He takes the position that "educational evaluation is a systematic and formal process of gathering information" which is used "to assess the merit or judge the worth of educational phenomena" to assist the making of educational decisions. In fact, for Bennett, "the importance of the decisions defines the importance of the

evaluation". The model he advances is based substantially on the work of Stufflebeam, particularly his CIPP (context, input, process, product) model of evaluation(5), which recognises the need for different kinds of information at different levels and locations in complex educational systems, which involves both the "decision-maker" and evaluator in shaping the evaluation (determining questions to be followed and forms of reporting to be adopted), and which leaves the evaluator the task of data collection.

Bennett's version of the Stufflebeam model, then, aims at providing an information service for "decision-makers" and developers of curriculum materials in environmental education. He points out that the effect of limiting or shrinking financial resources has "contributed to the need to assess and compare alternative methods of curriculum instruction", and claims that educational decisions "are based on comparison of the programme's outcomes with the goals and objectives which were established to meet identified needs". Bennett's view of the role of the evaluator is one of assisting the educational decision-maker to compare alternative curricula by determining their relative effectiveness in matching educational outcomes (in the form of student learning) to program goals. The aim of evaluation, in Bennett's view, is program improvement rather than terminal judgement -- the latter task is left to the educational decision-maker. His view of the division of labour in curriculum evaluation is reminiscent of that of Cronbach, who claims

that the job of evaluation:

is to collect facts the course developer can and will use to do a better job, and facts from which a deeper understanding of the educational process will emerge(6).

The model advanced by Bennett illustrates two forms of evaluation processes -- formative and summative(7). As described by Bennett, these forms are isomorphic, and their difference lies in the time of their application: formative evaluation occurs throughout the process of development and implementation; summative evaluation occurs at the end of program development. The two forms are isomorphic in the sense that both entail the comparison of quantitative data with previously-determined intents or goals. In Bennett's words, formative evaluation "consists of identifying intents, planning measurement methods, collecting data, comparing with standards and making decisions"; summative evaluation "is concerned with the congruence and discrepancy between goals-objectives and measured achievement of objectives". The emphasis in Bennett's model upon technical determination of the fidelity of outcomes to intents imposes a need for "the most accurate measurement and assessment techniques possible" -- techniques that should be valid and reliable. This latter quality entails that the research design be responsible: "the replication of the teaching process and evaluation during the formative stages also increases the stability and reliability of the results".

That a view of curriculum is embodied in views of educational research and evaluation is demonstrated by

Bennett. In his paper ostensibly "concerned with determining the art of evaluation of student learning in environmental education", he also offers an explicit model of curriculum development and improvement.

For Bennett, the first phase of curriculum development involves the identification of "needs" or antecedent conditions to which the program is addressed. For environmental education, he identifies the following needs:

- (a) the need for environmental quality;
- (b) the need for motivated, informed and active people to work for environmental quality;
- (c) the need for improved methods of teaching.

Social need questions are obviously value-laden, as the use in these examples of such terms as "environmental quality", "motivated, informed and active people" and "improved methods" clearly indicate. The second phase involves the "translation of needs into goals". With their value-laden heritage, such goals can be expected to be similarly value-laden, as the example provided by Bennett illustrates:

To help individuals acquire strong feelings fundamental to developing a concern for the environment and a motivation to participate in activities for maintaining and improving the quality of the environment(8).

The third phase consists of "translating goals into major behavioural objectives which may be used as a basis for developing a wide variety of programmes". Bennett's example is:

The student will increasingly identify existing and potential environmental issues and problems and choose, plan and help carry out solutions which place people in the role of stewards and creators of a quality environment.

The fourth phase involves "defining major behavioural objectives as measurable objectives", in order to provide the basis for development and evaluation. An example of an objective designed to guide development is:

The students select and complete an optional assignment requiring the listing of three problems on the school site, choosing one and describing how it could be solved according to the six common problem-solving steps.

An example of how the same objective could be developed to form the basis of a test item is:

The student will, given a series of slides, select environmental problems and choose alternative solutions with appropriate rationales which demonstrate the high value of man as a steward and creator of a quality environment.

For Bennett, "objectives this specific provide for the development of test items which are, in effect, criteria for measuring the extent to which the objectives have been achieved". It is intended that these texts be used "to assess the educational programme according to the kind of decisions to be made".

The fifth phase of the model is "the development of the programme resources, content and activities and identification of student and teacher roles. These are based upon the measurable objectives". The final phase is the development of the of the evaluation plan, which has both summative and formative elements.

Bennett's model of evaluation in environmental education, and the way of thinking about curriculum which it both manifests and supports, is essentially rational, empirical, applied-science and behavioural objectives-driven -- in short, a positivist perspective. Its positivistic character is evident in these features:

(i) It is objectives-oriented, yet only in a technical sense. That is, its prime concern is the determination of objectives/outcomes congruence, yet it provides no way of gaining a critical understanding of the worth or merit of the objectives themselves -- no way of judging their normative or ideological appropriateness. Their "worth" can be technically assessed in terms of their ease of achievement. Their ideological content cannot be assessed.

(ii) Its modus operandi is borrowed from the natural sciences. Objectives/outcomes congruence is seen as determined by empirical measurement. The language is reminiscent of agricultural experimentation: "Is the research design reproducible or replicable?"; "Is the sample design adequate?"; "What are pre-test/post-test considerations?"; "What are experimental and control group considerations?".

(iii) It perceives educational change as being value-free. This is implied by the adoption of a scientific modus operandi. The science method seeks to separate facts from values, and attempts to eradicate the latter. The research design of the model aspires to reproducibility -- a notion which is predicated on the

assumption that human values are either absent or controllable in the different settings in which the design is to be instituted.

(iv) The model perceives the evaluation as requiring specialist expertise, and the evaluator as being an "outside expert" -- an operative external to the world of the practitioner, and in possession of special expertise in design and application of measuring instruments, and in the analysis of data. Being based on the notion of specialism, the model implies, therefore, a sharp division of labor -- of job-roles -- between decision-makers, evaluators, and practitioners.

(v) the model is based on a view of social change through bureaucratic rationality : it proposes a form of evaluation that is in service to a bureaucracy, to the "decision-makers" who act upon the "evidence" pertaining to the relative efficiencies of alternative programs. The interests being preserved by a model of this type are those of the personnel who formulate the "goals", "objectives" or "standards" (or the interests of those to whom they are bureaucratically responsible), since application of technical intent/outcome congruence testing assumes the prima facie legitimacy of the values and interests expressed in goal statements, and embodies no systematic procedure for the critical analysis of these values and interests or alternatives to them.

The Resonance of Positivist Research and Evaluation with
Environmental Education.

What are the resonances of positivist approaches to educational research and evaluation on the one hand, with the educational problem of environmental education on the other? In particular (following the argument of Chapter 8 that environmental education has become technologised), to what extent does the view of the relationship of theory and practice embedded in such approaches address the issue of technologisation and foster a critical analysis of technologising tendencies in environmental education and human relationships with the environment? The intention in this section is to extend the critique of positivist approaches to educational research and evaluation begun in Chapter 2 by presenting specific arguments grounded in the perspective on the educational problem of environmental education developed in Chapter 9. It will be argued that positivist approaches cannot comprehend that environmental issues and environmental education issues are essentially contested, -- that different perspectives on the environment and environmental education represent not only different values, but also different interests, grounded in different relationships between people and the environment and between people in education.

(a) Positivist thinking engenders the view that environmental problems are susceptible to purely technical solutions.

This argument concerns the effect of positivist thinking on perceptions of environmental problem-solving. This argument, too, is based on a recognition of the incapacity of applied-science approaches to deal with value questions.

Consider a concrete example of an environmental problem. Geddes Pond is part of a "lake" formed by the Huron River in Gallup Park, Ann Arbor, Michigan. Geddes Pond is the site of extensive recreational usage on summer days; one of the forms of recreation is sailboard riding. A private operator hires out sailboards to learners in the sport (practised enthusiasts tend to prefer more demanding conditions than those prevailing at Geddes Pond), and a combination of a lack of expertise and the precarious nature of the sport (success is measured in minutes) results in much contact between the bodies of the recreators and the benign waters of the Pond. Appearances, however, can be deceptive and the benign nature of the Pond is at times only meniscus-deep. Students from the University of Michigan's School of Natural Resources make periodic determinations of the "water quality" of Geddes Pond. Measures are taken of the following parameters: fecal coliform; biological oxygen demand; water temperature; dissolved oxygen; pH; nitrates; turbidity; total phosphates; and total solids. From these data, a single "overall water quality index" is computed. The results of these investigations show a variable water quality.

This situation represents an environmental problem in this sense: on the one hand, there is a group of individuals wishing to pursue a form of recreation in an aspect of the local environment; on the other hand there is evidence of periodic health risks which a responsible local government may be concerned about to the extent of preventing recreational usage of the Pond. Should the local government intervene? How will officials know when to take the action of prohibiting sailboard riding in the lake? Is the problem severe enough to warrant the larger-scale action of determining which of hundreds of nearby houses have unsatisfactory solid waste disposal systems and remedying that problem? Who is responsible for health problems resulting from recreational usage of the Pond -- the sailboard operator, individual recreators, or local government?

Clearly, these and other relevant questions cannot be answered on the available scientific evidence alone. Even the question which prima facie appears to be most susceptible to scientific resolution, "How will officials know when to take the action of prohibiting sailboard riding in the lake?", requires more than a technical input. The students' information on the quality of the water will be taken into account (that is, there is a scientific dimension to this environmental problem), but the ultimate decision-makers may make a decision simply by comparing a measure of water quality with an accepted standard (for example, an EPA maximum fecal coliform count for safe body contact). But the decision of the EPA in

arriving at its "standard" and the decision of the local authorities to accept the EPA figure both involve value judgements. What is being said here is not only that most "quality of life" or "social need" environmental problems have more dimensions than a purely scientific/technical one (in this case, recreational, legal and health dimensions are involved), but also that the "bottom line" decision is not even technical in the sense of being rationally-deducible from available evidence of any form -- it is ultimately determined by the decision-maker's value structure(9).

Given this necessarily value-laden component of environmental problem-solving, the inappropriateness of positivistic thinking to environmental education emerges. Positivism dogmatically asserts the linkage of science with legitimate knowledge -- the methods of natural science are seen as necessary and sufficient to the resolution of all sensible questions. That is, according to positivist thinking all environmental problems are susceptible to essentially technical solutions; it is assumed that this debate over environmental issues proceeds in a way which can be resolved objectively through the rational assessment of the knowledge to hand. This raises the profile of "education about the environment" -- those interpretations of environmental education which deal with informational and technical environmental matters. Positivism regards as unproblematic the non-empirical dimension of environmental problem-solving; debates over environmental issues are not

seen as expressions of competing value sets -- value consensus is assumed, and a unitary conception of the environmental problem emerges. An instrumental, universal procedure for resolution of the issue is devised as if "ends" (desirable use of the environment) are agreed.

An example of this "scientisation of environmental problems" can be seen in Bennett's "state of the art" paper on evaluation in environmental education(10). Working from a "need for environmental quality" (clearly a manifold, value-laden notion), Bennett's positivist model of evaluation prescribes as its "fourth phase" the defining of "major behavioural objectives as measurable objectives", with the following cited as an example:

The students select and complete an optional assignment requiring the listing of three problems on the school site, choosing one and describing how it could be solved according to the six common problem-solving steps.

Here the prescribed (positivist) form of evaluation creates the impression that a "technology of problem-solving" exists (this technology has six steps), and that this technology is universalised or generalisable (the steps are "common"). This process of "scientisation" contributes to, at best, a partial appreciation of environmental problems -- it is a source of "structured blindness" about the political dimensions of such problems. Thus the scientisation of environmental problems by the dominant form of educational research and evaluation is a form of ideology. By creating the impression of a technology of environmental problem

resolution, it obscures the vested interests of participants in the problem. It also lowers the profile of "education for the environment" -- that which seeks to explicate political' (value-laden) interests at play in environmental issues.

(b) Positivist approaches to educational research and evaluation engender the view that problems of educational change in environmental education are susceptible to purely technical solutions.

This argument concerns the effect of positivist thinking on perceptions of educational-solving in environmental education. The argument is based on the incompetence of positivist approaches to deal with value questions.

According to positivism, scientific methods are the only rational avenue to valid (and certain) knowledge; scientific meaning is viewed as a property only of propositions that can be tested by means of observation; hence the only positive and therefore legitimate route to truth is an empirical one(11). Positivists argue that value judgements cannot be so tested (since they are not susceptible of empirical enquiry and their truth claims cannot be verified or falsified through empirical enquiry), so it follows that on the positivist perspective they cannot be given the status of legitimate knowledge. They are not the subject of "proper research". Positivist approaches, then, preserve a fact/value distinction, and

confine research to the testing of "factual" propositions (those having potential empirical content) rather than value-laden propositions.

Given their premise of a fact/value distinction, positivist approaches have to argue for a parallel distinction between educational means and educational ends. Since educational ends (goal statements) are clearly the expression of the values of the goal-setter (consider, for example, the debate that could be mounted on the appropriateness of Bennett's "second phase" example cited earlier), the advocates of positivist approaches argue that the determination of most effective means to certain ends (value-laden goals) is something that can be achieved objectively through the rational assessment of evidence. That questions about the most effective means to chosen ends are assumed to be technical and instrumental questions susceptible of rational, empirical attack is illustrated in Bennett's emphasis on testing in his "fourth phase".

The resulting emphasis in environmental education research and evaluation on testing for congruence between educational goals and educational outcomes creates the impression that environmental education problems (that is, problems associated with bringing about innovation or change in the name of "environmental education") are susceptible of purely technical solutions. The notion that "outside" evaluation experts working on behalf of program developers can operate "objectively" in determining

answers to instrumental questions about relative "effectiveness" of alternative environmental education "treatments" promotes an insensitivity to the norms, beliefs and patterns of participants in the innovation situation. That is, positivist concepts of "legitimate knowledge" imply that technical solutions are "the only ones worth knowing about". They imply that the effects of personal characteristics of participants (for example, their presuppositions about curriculum and teaching) -- and their embeddedness in historical/social contexts -- can be disregarded.

In fact, of course, the problem exceeds a disregard for personal and historical/social factors affecting change; positivistic approaches seek to actively neutralise the effect of contextual factors affecting environmental education. Neutralisation occurs through attempts to randomise contextual variables by using large sample sizes, and to control variables by some artificial manipulation. That is, in the interests of objectivity-as-reliability, the particular historically-located and socially-embedded values, interests and circumstances of particular teachers are obliterated as a technical matter of experimental design, and the possibility of these circumstances appearing in complex, multi-faceted explanations of the innovation and its setting is precluded.

The incompetence of natural science methods to deal with value questions has a further fairly obvious

implication -- it means that the actual goals of a program escape scrutiny. The only sense in which goals are evaluated by positivistic approaches is in terms of assessment of their utility in being achievable by the program "treatments" -- and this, of course, says nothing about, say, their ideological appropriateness. The particular valued interpretations put on goals in environmental education escape scrutiny.

As mentioned earlier, advocates of positivist approaches invoke a means/end dichotomy to enable them to simultaneously acknowledge their inability to address the values of goals (ends) and maintain an "area of expertise" -- that of informing decision makers about the relative efficiency of alternative means in achieving certain goals. Their claim is that research work of this kind is value-free. However this claim is contested, with some writers maintaining that means are also valued. For example, according to Carr and Kemmis "the idea that educational decisions can be neatly divided into purely instrumental questions exclusively concerned with means, and value questions exclusively concerned with ends is incoherent"(12). As has already been discussed in Chapter 2, objective perceptions are impossible because of the effect of observers' internal conceptual structures in dealing cognitively with perceptions, and because the language invoked in formulation and communication of perceptions is theory-laden. This means that questions of ends and means both involve values.

There is a further sense in which the assumption of a parallelism between a "means/end" distinction and an "instrumental/value" distinction is untenable -- a sense to do with the special character of the relationship between means and ends in education. Carr and Kemmis claim that:

a point constantly stressed by all educational philosophers is that educational aims are not descriptions of some desirable end-state that can serve as criteria for assessing the success or failure of some extrinsically-related 'means'. Rather they are attempts to specify the sort of values to which any distinctively educational methods and procedures must conform and, as such, are always intrinsically related to educational means(13).

That is, the relationship between ends and means is a value-laden one. The sphere of influence of the values which are expressed in goals is not restricted to the goals alone; the same values are invoked when assessments are made of the educative value (within the context in question) of candidate means. In the light of any particular educational goals, candidate means must survive scrutiny in terms of educational values even before instrumental questions about their technical effectiveness arise. An example of this value-laden means/end relationship is provided in Bennett's paper: the goal about improved "motivation to participate in activities for maintaining and improving the quality of the environment" enables value judgements to be made about what type of content activity (means) is appropriate. Clearly an activity emphasising the profitability of a range of land-development ventures, coupled with reinforcement of the desirability of successful private

enterprise would be deemed inappropriate in the light of the cited goal; empirical testing of the effectiveness of such a teaching strategy would most likely not eventuate. Conversely, a decision in favor of activities such as the two cited by Bennett in relation to his "fourth phase" is readily made as a value judgement prior to any empirical test of effectiveness of candidate activities (were such testing possible).

This consideration of the relationship between means and ends has argued that questions about means in education involve educational values. The application of natural science (positivist) methods of research and evaluation to problems concerning means (educational programs; teaching activities) in environmental education would, as a consequence of their empiricist view of knowledge (in particular, their premise of a fact/value dichotomy), put these values beyond scrutiny.

This argument, then, is that positivist thinking fosters the view that problems about educational change are susceptible to purely technical solutions in that the effects of teachers' presuppositions about teaching and curriculum, and their historical/social contexts (both their educational context and their environmental context) are discounted, and the differing valued interpretations of key goal-constitutive terms like "environmental education" are not amenable to critique. To the extent that teachers' presuppositions, contextual factors including texts, discipline-centred curricula and habitual

teaching activities, and the ambiguity of the term "environmental education" -- in short, the dynamic stability of the status quo form of organisation -- contribute to reinforcement of environmental education as "education about the environment", positivistic thinking expressed through educational research and evaluation acts as a powerful conservative force in opposition to attempts at change in the name of environmental education.

(c) Positivist approaches to educational research and evaluation have greater capacity for control than for critical appraisal.

In the light of the "reconstructed problem of environmental education" proffered in Chapter 9, a coherent form of research would need to "empower" practitioners to engage in critical appraisal of their personal theory and practice, and of the ways their theory and practice is historically and socially embedded. In light of "education for the environment", a coherent form of evaluation would "empower" pupils to engage in critical appraisal of the historical and social context of actions taken in controversial environmental issues. Positivistic approaches to educational research and evaluation operate to "disempower" both teachers and pupils.

Teachers are disempowered because in positivist thinking, as expressed for example in research associated with the RDDA model of innovation, they are regarded as "passive receivers" of "tried-and-true" curriculum

materials; they are regarded professionally as "technicians"; their work is "evaluated" in the light of externally-determined ends, with little recognition of the peculiarity of different educational settings; they have no control over the information that is passed on by outside evaluators to the educational policy-makers whose decisions will shape their lives; above all, the possibility that teachers might possess a theory of their own is not considered. By their inability to address the value positions inherent in educational goals, positivist approaches in fact reinforce the educational assumptions prevailing in the existing educational institution and tend to focus on the efficiency of the knowledge distribution and acquisition system. Such an "efficiency-oriented" perspective tends to take the system for granted, and leaves unexamined the interactive resonances between teacher, context and innovation. To the extent that the constraints to environmental education as "education for the environment" are institutional in origin, the essentially conservative character of positivist approaches is hostile to environmental education. To the extent that such approaches -- by construing their role as the instrumental determination of the congruence between goals and outcomes -- present innovation problems as "rhetoric/reality" gaps, they divert practitioners from analysing the interactions of theory, practice, and circumstance in their own environmental education programs in their own settings.

Learners are also "disempowered" when positivist

approaches to evaluation extend to the interactions between teacher and learner. Such situations are characterised by the acceptance of the notion of objectively existing fields of knowledge. The teacher is seen as an expert-in-knowledge, selecting and sequencing aspects of knowledge to be passed on to the learner. This establishes an authority-hierarchy in the classroom -- a hierarchy in favour of the teacher. "Knowledge" is what is legitimated by the teacher by its selection for transmission to learners. For learners, to "know" is to represent the language of the authority -- teacher or text. Learners are the "passive receivers" in the rational process of instruction, communication tends to be one-way, and learners have little control over the knowledge they receive. This knowledge comes complete with a value structure, since value judgements are made by the school, curriculum committees and teachers in respect of selection and sequencing of the knowledge. However, these value structures are not opened up in this form of education; learners absorb the knowledge, and with it the hidden value-set of the authority (school, committee, teacher or text). In general, the outcome of teacher/learner interactions in educational settings informed by positivist thinking is that learners are not encouraged to be critical, independent thinkers. The tendency is for learners to adopt unconsciously the implicit value set of the authority.

What is being said here, then, is that positivist approaches represent a definite perspective on the

relationship of theory and practice, of knowledge and action. Put simply, this perspective entertains the possibility of a disjunction of theory from practice, of knowledge from action. When this perspective is manifested in social contexts -- in for example, the contexts of educational change like environmental education -- it amounts to a political theory of control, rather than one of critical appraisal.

What counts as "theory" on this view is the policy of those "in authority" -- in the case of environmental education, this includes members of the academy who write accounts of international conferences, national curriculum development agencies, and state-level environmental education committees. When viewed from positivist perspectives on innovation and educational research and evaluation, this "theory" is seen as objectively-existing -- it becomes reified. Reified theory is regarded as a criterion against which practice (the work of classroom teachers) can be measured. Control of the "theory" (language, policy) of environmental education results in control over the direction that practice is to take. The positivistic disjunction of theory and practice ensures that those "in authority" maintain their control over the "theory". Positivist educational research, by confining its attention to academic theories of environment and education to the virtual exclusion of practitioners' theories, also denies practitioners the power (through critical appraisal of their theory and practice) to identify and address those very contradictions existing in

theory, practice and circumstance which constitute the conditions of continuity. The opportunity for participation in educational research is also denied teachers, since the applied-science character of positivist educational research demands expertise in experimental design and statistical analysis that is usually possessed only by research specialists. The result is the disempowering one of teachers' having their educational practices shaped by educational decisions informed by research activities in which they were not participants. The interests being served by positivist approaches to educational research and evaluation are the technical interests of social control. Positivistic approaches to educational research thus serve to recreate the kinds of problems believed to be at the heart of the environmental crisis (for example, the division of labour between specialists and non-specialists which restricts responsibility for the analysis of problems and their solutions, and fragmentation of knowledge).

Positivist Approaches in Environmental Education: An Incoherent Form of Educational Research and Evaluation.

To apply positivist educational research, exemplified by statistics-based pre-test/post-test experimental designs, in environmental education is incompatible with the nature of environmental education as education for the environment. Positivist educational research engenders a technicist view of environmental problems; it fails to acknowledge the personal beliefs and assumptions

("interpretive categories") that guide the practice of individual practitioners; it fails to recognise the "technologising" influence of the hegemony between the dominant view of educational change, institutional structures and technicist expressions of environmental education; it construes "educational problems" as "rhetoric/reality gaps", or the failure of teachers to match their practice to the policy of those in authority, rather than matters of false consciousness and hegemony; it construes the purpose of educational research as informing educational decision-makers about the most effective ways to achieve their goals; it construes the activity of educational research as instrumental determination of the fidelity of outcomes to goals, rather than as ideology-critique. Positivist educational research thereby fails to engage and contest the resistance of established modes in the organisation of current environmental education. Under the guise of neutrality (allegedly conferred by an objectivist view of knowledge), positivist approaches express the politics of continuity. The epistemology of environmental education as "education for the environment" is post-empiricist; the epistemology of the view of educational change through which the educational problem of environmental education can be recognised is also post-empiricist; the epistemology of positivist approaches to educational research is empiricist. Judged by the aspirations and character of "education for the environment", therefore, the positivist approach to research in environmental education is incoherent.

10.2 Interpretive Approaches to Educational Research and Evaluation: A Critique

The history of educational research and evaluation reveals a range of approaches that could be termed interpretive(14): some of these are Stake's "responsive evaluation"(15), Parlett and Hamilton's "evaluation as illumination"(16), the case study work of Adelman(17) and others, and Eisner's "educational connoisseurship"(18). A common feature of these approaches is their recognition of the pluralism of valued perspectives in educational settings. The notion of values pluralism contrasts strongly with the notion of consensus characterising earlier, positivistic, approaches -- the view that agreement about educational aims can be assumed, leaving the role of research and evaluation as one of determining the fidelity of outcomes to such goals.

According to Hamilton(19), one of the earliest advocates of a pluralist perspective in educational research and evaluation was Stake. In two important papers(20), Stake demonstrated a recognition of the locatedness of individual participants' points of view, an acceptance of participants' judgements (rather than only those of outside observers), an orientation towards the program's activities, rather than only to its intents, and a concern with the usefulness of the outcomes of an evaluation to its participants, rather than only to "decision-makers". Stake calls his view of evaluation responsive:

An educational evaluation is responsive if it orients more directly to program activities than to program intents; responds to audience requirements for information; and if the different value-perspectives present are referred to in reporting the success and failure of the program(21).

Stake advocates the collection of participants' perspectives and judgements into a portrayal of the educational program in question. Kemmis describes the characteristics of an educational portrayal:

By developing a portrayal of an educational program, an evaluator hopes to 'tell its story', to inform the evaluation audience about the nature of a program, its unique features, its successes and failures, the issues surrounding it, the people who staff it, and whom it serves. In producing the portrayal, the evaluator acts as mediator, transforming the experience of program participants into a form that can be experienced by the audience(22).

For Stake, the justification for his advocacy of evaluation as portrayal, rather than what he terms "pre-ordinate" evaluation methods, is the improvement of "communication with audiences"(23). He seeks to achieve this aim by providing vicarious experience :

The best substitute for direct experience is probably vicarious experience (increasingly better when the evaluator uses attending and conceptualizing styles similar to those which members of the audience use). Such styles are not likely to be those of the specialist in measurement or the theoretically minded social scientist. Vicarious experience often will be conceptualized in terms of persons, places, and events.

We need a reporting procedure for facilitating vicarious experience. We need to portray complexity. We need to convey holistic impression, the mood, even the mystery of the experience.

Stake's justification for responsive evaluation is

improved communication: it is hoped that portrayals of educational programs will contribute to the enlightenment of the individual participants in the program, though it is recognised that such enlightenment is no more than a step to hoped-for action.

Speaking about the "utility and legitimacy" of a responsive evaluation of an arts program, Stake suggests that:

The purposes of the audiences of the evaluation are all-important. What would they like to be able to do with the evaluation of an arts program? Chances are they do not have any plans for using it. They may doubt that the evaluation study will be of any use to them. But charts and products and narratives and portrayals do affect people. With these devices persons become better aware of the program, they develop a feeling for its vital forces, a sense of its disappointments and potential troubles. They may be better prepared to act on issues such as change of enrollment or reallocation of resources. They may be better able to protect the program(24)

The distinguishing methodological idea of interpretive approaches to educational research and evaluation of the type suggested by Stake is one in which an outside agent seeks to construct interpretations of the subjective meanings in terms of which actors in a social setting make their actions intelligible(25). Interpretive approaches are based on a different epistemology to positivist approaches: the "verstehen method" of interpretive approaches, with its emphasis on the articulation of subjective meaning structures, reconciles knowledge and values in the manner of post-empiricist conceptions of science. Such approaches attempt to develop interpretive constructions of the meaning of particular forms of social

life; in the case of educational life, their concern is with the personal beliefs and assumptions which guide the practice of individual teachers. These features of interpretivist approaches suggest a greater compatibility between interpretive approaches and environmental education than exists between positivist approaches and environmental education; however, some problems remain in conceptions of the relation of theory and practice, and the role of research in educational change.

An Example of An Interpretive Account of Environmental Education

At the third biennial national conference of the Australian Association for Environmental Education, Parry(26) presented a case study entitled "Initiating Curriculum Planning in Environmental Education". Parry's abstract states that:

This paper will investigate the processes of initiating curriculum planning in environmental education. It will attempt to identify and interpret the problem-solving and decision-making strategies employed by teachers in a school-based curriculum project at a Queensland secondary school. Planning in this project placed considerable emphasis on deliberation, problem-solving and consensus decision-making. Two curriculum planning phases have been delineated. The first was a gradual process consisting of weekly meetings and provides most of the data for this paper. The second phase consists of monthly meetings which addressed the curriculum development constraints identified in phase 1. Data has been collected by observation, transcript and document analysis, teacher diaries and interviews. In particular, the paper will attempt to illuminate the institutional and human barriers faced by the implementation of environmental education in a secondary school.

In his Introduction to the paper, Parry claims that "existing research in environmental education tends to ignore the processes of school-based curriculum development and the issues of institutional adaptation". His own "case study" investigation was guided by the following questions(27):

- * How can the process of curriculum planning in environmental education be initiated at the school level?
- * Does a school have the capacity and willingness to respond to environmental education?
- * How is environmental education perceived within the context of other educational priorities and constraints?
- * How do the participants reach a common understanding of environmental education and the purpose and direction of their work?
- * What is the structure, scope and sequence of the curriculum planning process?

These guiding questions suggest an interpretive study: they are interested in the subjective meanings in terms of which the participants in the program make their work intelligible ("How is environmental education perceived...?"); and they are oriented more towards program activities ("the process .. structure, scope and sequence of the curriculum planning process") than to program intents. These questions are not of the type that can be addressed through quantitative, instrumental (positivistic) methods; Parry used "ethnographic methods based largely on participant-observation", including:

- (a) Observational records of planning sessions;
- (b) Tape recordings of discussion at planning sessions;
- (c) Tape recorded formal interviews with all participants; and
- (d) Use of documents, teacher diaries, theoretical insights gained and contact with participants(28).

In short, according to Parry, the study "attempts to describe the program through the observations of the researcher and the participants"(29).

The substantive outcomes of the study included accounts of the program's events during "planning" and "developmental" phases, and decisions, actions, opinions and justifications of participants in relation to the program. For example, the case study reports that:

Although the goals of the project had been discussed by all participants at the workshop, statements of purpose and rationale were periodically expressed by the participants. Naturally variations occurred and some confusion existed. Throughout the project however, a school-based environmental education philosophy did emerge. Its expression occurred at two levels: firstly, teachers accepted definitions presented at the workshop that emphasised the affective aspects of the intended curriculum; and secondly, teachers viewed environmental education as an orientation in the existing subject curriculum.

A number of institutional constraints to curriculum development in environmental education were identified by the participants in Parry's study(30):

1. Staff cooperation;
2. Integration of different subject areas;
3. In-service education of teachers;
4. Unwillingness of staff to change existing work programmes to incorporate environmental education;
5. Staff expertise and competence;
6. Desire for curriculum stability;
7. Staff awareness of environmental education;
8. Lack of staff understanding;
9. Threat to individual subject areas and teachers; and
10. Headmaster's commitment.

Parry concludes his report by listing some "processes and factors (that) were important in initiating and

sustaining curriculum planning in environmental education"
in the school described in his study:

1. Establishing a theoretical 'platform'

If a 'platform'(31) had been established it was achieved by:

- (a) Identifying interested teachers;
- (b) Focusing on teacher needs;
- (c) Incorporating opportunities for teacher-teacher interactions;
- (d) Supporting individual initiatives; and
- (e) Orienting teachers towards an interdisciplinary model of environmental education.

2. The planning process

The first phase of the project was characterised by the processes of deliberative and consensus decision-making. Teachers' perceptions indicate that the management strategies of Nominal Group Technique facilitated these processes enabling effective curriculum planning to occur.

3. Group collaboration

Although individual action was accepted as a legitimate form of input into the curriculum process, many teachers expressed the belief that group collaboration was more beneficial as it facilitated the consideration of many different suggestions and judgements(32).

In recognition of the locatedness of outcomes of interpretive work, Parry warns that "no single plan for implementing environmental education can be deduced" from his case study, and makes no claims about the general applicability of these "processes and factors".

The Resonance of Interpretive Approaches with
Environmental Education.

The intention is to extend the critique of interpretive approaches begun in Chapter 2 by considering (i) how environmental problems are perceived from an interpretive perspective, and (ii) the resonance between interpretive approaches and the educational problem of environmental education.

(i) Interpretive Approaches and "Environmental Problems"

It is argued here that interpretive thought (such as that informing interpretive approaches to educational research) is expressed in environmental education as environmental interpretation, sensitisation and acclimatisation activities(33), and further that such activities sustain a particular perspective on environmental problems and their resolution. These activities emphasise improved enlightenment and communication about, and empathetic understanding of, aspects of the environment. Environmental interpretation aims at assisting students to develop a personal interpretation of an environmental setting; sensitisation and acclimatisation activities aim at developing a concern for, or empathy with, the environment. Such activities aim at the development of a personal environmental ethic among students.

Consider an example. McFarland(34) describes a project

entitled "For every child: a tree" of which the purpose is to:

sharpen each child's senses through a variety of observations, to be a witness to the seasons' effects on one living thing, and to keep a detailed record of these observations. Once each month it will be "tree time" when pupils will record observations in their individual log books about their "own" tree. Each month there is a different way to observe the trees, and most of the changes in them have been taken for granted or never noticed before...
Once a child owns a tree he feels a personal interest in and responsibility for it that goes beyond his year's study.

What view of environmental problems does this type of activity sustain? First, it must be said that environmental interpretation, sensitisation and acclimatisation activities do not directly concern themselves with environmental problems in the sense that some technicist "problem-solving" activities do. Environmental activities informed by a liberal, interpretive philosophy are directly concerned with the development in individuals of a personal empathy with the environment. However, by emphasising the development of a personal empathy with the environment, and a personal interpretation of an environmental setting, such approaches provide no independent means for critiquing the ways in which personal feelings, interpretations and actions are shaped by self-interested individuals, social groups and institutions engaged in exploitation of the environment, and thereby fail to address an important category of environmental problems. This form of "powerlessness" -- an outcome of the relativity of interpretive thought -- is in fact acknowledged by

advocates of environmental interpretation(35):

(Environmental interpretation) stresses problem identification, diagnosis, and the presentation of alternatives for improving the situation. It does not include an evaluation of these alternatives and the selection from among them of the particular course of action to be pursued. This must be accomplished through activities, organisations and techniques for reaching consensus that lie outside the domain of interpretation.

The inability of interpretive thought to inform choice between alternative environmental interpretations, and thereby to permit prudent collective action against environmental exploitation, would appear to be a major inadequacy for dealing with environmental problems.

(ii) The Resonance between Interpretive Approaches and the Educational Problem of Environmental Education.

Three arguments bearing on this issue will be considered.

(a) The limitations of "enlightenment" in creating conditions for change

Interpretive approaches to educational research and evaluation assume a particular relationship between theory and practice in the way they construe educational change. Outsiders' interpretive reconstructions of the plurality of subjective meanings existing in a given social setting are seen as contributing to enhanced self-understanding ("enlightenment") on the part of participants. (In Parry's study, participants were able to explicate a number of

perceived "constraints to curriculum development" in their setting). These interpretive accounts may provide participants with new conceptual tools for interpreting their own actions. (In Parry's study, participants identified "deliberative and consensus decision-making" and "collaborative action" as important processes in curriculum planning in environmental education in their school). The increased self-consciousness of participants about the attitudes, beliefs and assumptions in terms of which they make their present actions intelligible creates the conditions for a critical reappraisal of those attitudes, beliefs and assumptions, thereby creating the possibility of changed practice. For interpretivists, the method of verstehen, by contributing to enlightenment, makes possible changes in practice: "practices are changed by changing the ways in which they are conceptualised and understood"(36).

The basic criticism of interpretive approaches from an environmental education viewpoint is that they don't go far enough. Their emphasis on "understanding" (enlightenment occasioned through interpretive reconstructions of subjective meanings of actions) and their opposition to the positivist notion of "explanation" (expressed as lawlike propositions couched in terms of causality, prediction and control) leads to a neglect of questions about the quasi-causal, dialectic relationships between individuals' subjective meanings (and the actions they justify) on the one hand, and external factors and circumstances on the other(37). Interpretive approaches

treat problems of social change as problems of communication (in which different individuals argue from different attitudes, beliefs and assumptions) that are resolvable through the explication of subjective meaning structures in which actions occur. There is the view that social conflicts are the result of conflicting interpretations of reality rather than contradictions in that reality itself(38). Thus problems of educational change, for example, are treated as requiring improved communication brought about by the explication of interpretive categories of educational practitioners, rather than as requiring changes in the structure and power relations of the educational context. Interpretive approaches overlook the possibility of incoherence and contradictions in the social reality of institutional education. There is no perceived need for social critique.

However analysis of the "social reality" of environmental education, as conducted in Part III, suggests that while the interpretive categories of teachers are important in shaping educational practices in environmental education (that is, practitioners do possess functional presuppositions about knowledge, teaching and curriculum), it is also the case that these interpretive categories, and the actions they justify, interact with a range of institutional constraints and organisational patterns. The proposition advanced in Chapter 8 was that there exists a hegemonic relationship between the dominant perspective on innovation, institutional characteristics and popular interpretations of teaching, curriculum and

environmental education itself; and that these elements interact to confront attempts at educational reform in the name of environmental education with a dynamic stability. Put simply, in environmental education there is a dialectical relationship between subjective meanings and social structures; it is too simplistic to assume that existing educational structure ("social reality") is sustained solely by the interpretations of individuals.

What is suggested here is that, from an environmental education viewpoint, interpretive approaches are an improvement over the positivist approaches they oppose by virtue of their recognition of the importance of the interpretive categories of practitioners in educational reform of environmental education. Their limitation, one that needs to be transcended by a coherent approach to educational research, is that they fail to examine the institutional structures and relations that interact to sustain the dynamic stability which results in continuity in the face of change. There is a need for critique of the "social reality" of institutional structures and relations if the conditions for the sort of change implied by environmental education are to be created.

(b) The inability of interpretive approaches to address those "unintended consequences" which contribute to continuity.

Unlike the "behaviours" which form the objects of positivistic educational research, the "actions" studied

by interpretive approaches are intentioned. It is precisely because actions are regarded as intended that the method of verstehen has a role in interpretive research -- one of explicating the interpretive categories (subjective meanings) in terms of which these actions are made intelligible. However, while all actions are intentional, it is not the case that all consequences or outcomes of all actions are intended: actors would not be conscious of all consequences of their actions(39). Furthermore, some of these unintentional consequences could be expected to be supportive of structures and relations that actually oppose the actor's original intentions. Yet because interpretive constructions are concerned with actors' intentions (that is, they are composed of interpretations of intended action only, and articulate the subjective meaning structures that justify or inform actions), such constructions cannot offer an explanation of unintended consequences, and their oppositional character remains unaccounted for.

This point can be exemplified by referring to an episode in the School-based Environmental Education Project reported in Chapter 5 (section 5.2). A teacher expressed an intention to try to align his teaching with a socially-critical form of education. This intention related to his presuppositions that knowledge ought to be intimately associated with active involvement, that pupils ought to be autonomous and responsible, and that pupils ought to be provided with opportunities to develop and defend their own arguments about social matters. These

beliefs were part of the teacher's "interpretive categories". The teacher's "intended action" was to employ the simulation game Walmit Divided (based on a number of hypothetical environmental issues) as the context of a series of lessons, to adopt a "neutral chairperson" role, and to organise his class into small groups. However, this well-intentioned "intentioned action" also had a number of unintended consequences: the pupils became dependent on the teacher to select an environmental issue for them to debate; and they developed a false sense of control over environmental issues (their power in debate and negotiations was a function only of some contrived or imagined, manipulable set of circumstances, rather than irrevocably grounded in "harsh reality"). These outcomes, which are in fact inconsistent with the teacher's view of what ought to happen in "good" environmental education, cannot be explained by reference to the teacher's intentions, and so would not figure in an interpretive construction. Thus, an interpretive approach to research would, in this example, not reveal that continued use of the simulation game, though ostensibly aimed at developing pupils' autonomy and responsibility, actually operated to sustain a dependent teacher-pupil relationship.

There is a need, then, for an appropriate form of educational research to go beyond the development of interpretive accounts of the subjective meanings held by practitioners, and to critically examine the extent to which the unintended outcomes of educational practices contribute to the continuity and stability of the

institutional system that shaped them.

(c) The inability of interpretive approaches to engage in ideology-critique.

There will be times when there will be variance between what practitioners believe they are doing and what they are doing -- that is when their intentional action has a character and produces consequences different to what they believe and intend. If interpretive research is being conducted by an outsider in a setting where this is the case, then the researcher would probably develop interpretive accounts to explain these actions which would differ to the accounts that the practitioners themselves would develop. That is, in those cases where practitioners are mistaken or deluded about their actions, alternative interpretive constructions are likely to be developed by researchers.

A problem arises when practitioners are confronted with alternative explanations of what they are doing. The subjectivist epistemology informing interpretivist research permits of no independent (objective) criteria for choosing between alternative constructions of subjective meaning(40). There is no reason why practitioners should accept an interpretive account -- an explanation of their actions -- that differed to their own. In fact, in many instances of interpretivist research, special principles of procedure are followed in order to ensure that interpretive accounts are compatible

with the participants' own accounts. This means that all those situations in which there are social structures or power relations which induce a form of "false consciousness" in practitioners about their work are left unexplained by interpretive approaches to educational research. All those instances where practices are continued as a result of the ideological distortion of ideas cannot be articulated. In the words of Carr and Kemmis(41):

By emphasising the importance of grasping the "intelligibility" of the individuals' own meanings and actions...the interpretive approach offers no way of identifying and examining the ideological character that these meanings and actions possess, and the purpose they serve in social life.

Constructing interpretive accounts of the subjective meanings of a situation without critique of the ideological character (including power relations) existing in that situation serves to reinforce those ideological conditions, making them more resistant to change.

Interpretive Approaches in Environmental Education: An Inadequate Form of Educational Research and Evaluation.

Interpretive thought creates the impression that the resolution of environmental problems is a matter of improving the individual's empathy with the environment. It promotes no collective action or critique of all of those environmental problems which are matters of environmental exploitation by self-interested individuals, groups or institutions.

In respect of the educational problem of environmental education, interpretive approaches, unlike positivist approaches, emphasise the interpretive categories of teachers -- the personal beliefs and assumptions that guide practice. In interpretive approaches, the purpose of educational research is construed as improving the consciousness of and communication about these beliefs and assumptions in the hope that the conditions for changed (improved) practice will be created. The activity of educational research is construed as the development, by outsiders, of interpretive accounts of the subjective meaning of action. (In the case study referred to earlier, Parry distinguishes between the researcher (himself) and the participants in the program).

The concern with the interpretive categories of teachers expressed by interpretive approaches (though not by positivist approaches) is coherent with the educational problem of environmental education. However the exclusiveness of this concern with the interpretive categories of teachers contributes to the inadequacy of interpretive approaches in dealing with the educational problem of environmental education. In stressing the articulation of subjective meanings of actions within educational contexts, interpretive approaches fail to address how the range of meanings is shaped by the educational and broader social context.

Further, again because of the exclusive concern with

the development of interpretive accounts of subjective meanings of action, the focus in interpretive approaches is solely on intended action, and the unintended consequences of such actions, while capable, perhaps, of detection by interpretive researchers, cannot be explained in interpretive accounts. In the language of Chapter 9, this means that all those instances of personal "theory-practice gaps" (or "false consciousness") will go unaddressed; interpretive approaches are unable to deal with an educational problem like that of environmental education which, as was argued in Chapter 9, needs to be construed as a series of theory-practice gaps. To the extent that some unintended consequences of intended action act in support of existing structures and relations in the educational context, this necessarily selective focus of interpretive research, by default, contributes to continuity in environmental education practices rather than to their transformation in improved forms of environmental education.

And finally, the inability of interpretive approaches to mount a critique of the ideology of a situation renders such approaches inadequate to the task of resolving the educational problem of the "technologising" effect of a positivist ideology. Educational change efforts, in the name of environmental education, are frequently organised along RDDA lines (as we have seen in the case of several innovation efforts discussed in Part II), with the results that practitioners are denied the opportunities to critically appraise their theory and practice -- their

rationality is subordinated as the "solutions" of outside experts are proffered and accepted. As stated in Chapter 9, continued irrationality of this type enables the persistence of an hegemony, of a dynamic stability in the face of reform: continuity in the presence of contestation. There is an ideology informing the organisation of environmental education -- the positivist ideology of reproduction of the status quo -- and their lack of ideology-critique prevents interpretive approaches from "exposing" that ideology, and therefore from offering a coherent response to the educational problem of environmental education. An adequate form of educational research must be capable of ideology-critique -- its interests must transcend the practical interest of enhanced communication and serve the emancipatory interest of social critique.

10.3 The Coherence of Critical Approaches to Educational Research with "Education for the Environment"

When positivist and interpretive approaches are considered in the light of the reconstruction of the education problem of environmental education (Chapter 9), it is clear that:

* Neither positivist nor interpretive thought construes environmental problems in a way that enables critique of the self-interests of opposing proposals for environmental action.

* Positivist approaches can be rejected as incoherent: as a consequence of their empiricist (objectivist) epistemology, they are unable to recognise the significance of either practitioners' interpretive categories or the hegemony of institutional education.

* Interpretive approaches are coherent to the extent that they recognise and engage the interpretive categories of practitioners, but inadequate because they are incapable of offering explanations of unintended consequences of actions and they are unable to engage in ideology-critique.

* A coherent and adequate form of educational research and evaluation for environmental education would need to transcend the limitations of interpretive approaches in these two respects, viz:

- (i) it would need to engage unintended consequences of actions -- or put another way, engage personal theory-practice gaps by providing practitioners with the skills and resources for critically appraising alternative interpretive constructions of the subjective meanings of their actions, and
- (ii) it would need to engage in ideology-critique -- that is, the critical appraisal of the structure and relations that engender and sustain the beliefs and assumptions that guide practitioners' actions.

From the description in Chapter 2 of a range of approaches to educational research and evaluation, it would appear that critical approaches may comply with these requirements. As stated in Chapter 2, the main

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features of a "critical educational science"(42) are :

- (i) It must reject positivist notions of rationality, objectivity and truth.
- (ii) It must employ the interpretive categories of teachers (or other participants directly concerned with the practices under inquiry).
- (iii) It must provide ways of distinguishing ideas and interpretations which are systematically distorted by ideology from those which are not, and provide a view of how distorted self-understandings can be overcome.
- (iv) It must be concerned to identify and expose those aspects of the existing social order which frustrate rational change, and must be able to offer theoretical accounts which enable teachers (and other participants) to become aware of how they may be overcome; and
- (v) It must be based on an explicit recognition that it is practical in the sense that the question of its truth will be determined by the way it relates to practice.

Just as critical approaches to educational research are sensitive to forces of social oppression(43), so critical thought enables environmental problems to be construed as cases of environmental exploitation -- as involving actions driven by certain self-interests which need to be understood socially and historically. In respect of the educational problem of environmental education, critical approaches share with interpretive approaches a concern with the interpretive categories of practitioners, but their distinguishing feature is their perspective on the influence of historical conditions and social institutions in shaping the consciousness and rationality of individual practitioners. While positivist approaches serve the technical interest of control, and interpretive approaches serve the practical interest of communication and understanding, critical approaches serve the emancipatory

interest of ideology-critique. Critical approaches aim at knowledge in the form of a critique of "the ways and extent to which existing forms of communication may be systematically distorted by prevailing social, cultural, or political conditions"(44). Ideology-critique is the essential element of an approach to educational research that aspires to mount a coherent attack on the hegemony of the educational problem of environmental education.

It now remains to consider a concrete form of such a critical approach to educational research -- and in particular to comment on the congruence of its view of theory and practice with that in the reconstructed educational problem of environmental education. The concrete form to be considered is action research.

Action Research - A Coherent Form of Educational Research for EE?

(a) Definition of Action Research

According to the International Encyclopaedia of Evaluation: Research and Studies, action research is a form of self-reflective enquiry undertaken by participants in social (including educational) situations in order to improve the rationality and justice of (a) their own social or educational practices, (b) their understanding of these practices, and (c) the situations in which the practices are carried out(45).

(b) The Method of Action Research

Action research recognises that teaching, and educational practice in general, is complex, problematic and uncertain and takes place in a context that is complex, changeable and politically-formed. It is characterised by a method comprising recurrent cycles of three phases. There is a Planning phase, in which existing personal practice is regarded as problematic -- individual practitioners look for dissatisfactions, or areas with room for improvement, in their own practice. Of course, "dissatisfactions" and "improvement" are terms whose meaning is embedded in theoretical discourse about the nature and purposes of the educational practices being engaged in -- the sense in which improvement of a particular practice is understood can be traced to a particular subjective conception held by the practitioner about what is being practised. What is "planned" in this phase is an educational activity in which it is possible to exercise or manifest the sought-after improvement. The Action phase occurs when the plan is put into practice in an educational setting. In addition to trying to manifest a desired improvement in an educational activity, the practitioner organises a means of monitoring the events in that process (for example, the activity may be videotaped or audiotaped). The means of monitoring must be capable of detecting when an improvement (in the practitioner's own terms) has occurred. The third phase is Reflection: in this phase, the data collected from monitored action are analysed. In particular, the practitioners reflect

critically on the relationship of their practice (the monitored action) and their subjective view of what is being practised (the "theory" guiding their practice). They may ask such questions as, "Was improvement evident?"; "Did it go far enough?"; "What further changes to my practice might enable further improvement?"; "What institutional barriers were encountered in this attempt at improvement?"; "What beliefs and assumptions about teaching, schooling, or what is being taught were evident in my practice?"; "Is my conception of my practice in need of adjustment in light of this practical experience?". In the light of undertakings generated in this three-phase action research cycle, the next Planning phase is entered.

Action research, then, is mediated by praxis, a process of critical reflection upon personal practice engaged in by the practitioners. It aims at personal improvement through praxis applied at the level of the dialectic between thought and action. It also aims at program and institutional improvement through praxis applied at the level of the dialectic between individual action and societal structure and history (that of the program, or the institution, or society at large). Action research contributes to rational decision-making in the sense that the practitioner (or group of practitioners) is able to choose between alternatives whose respective rationales have been subject to deliberation.

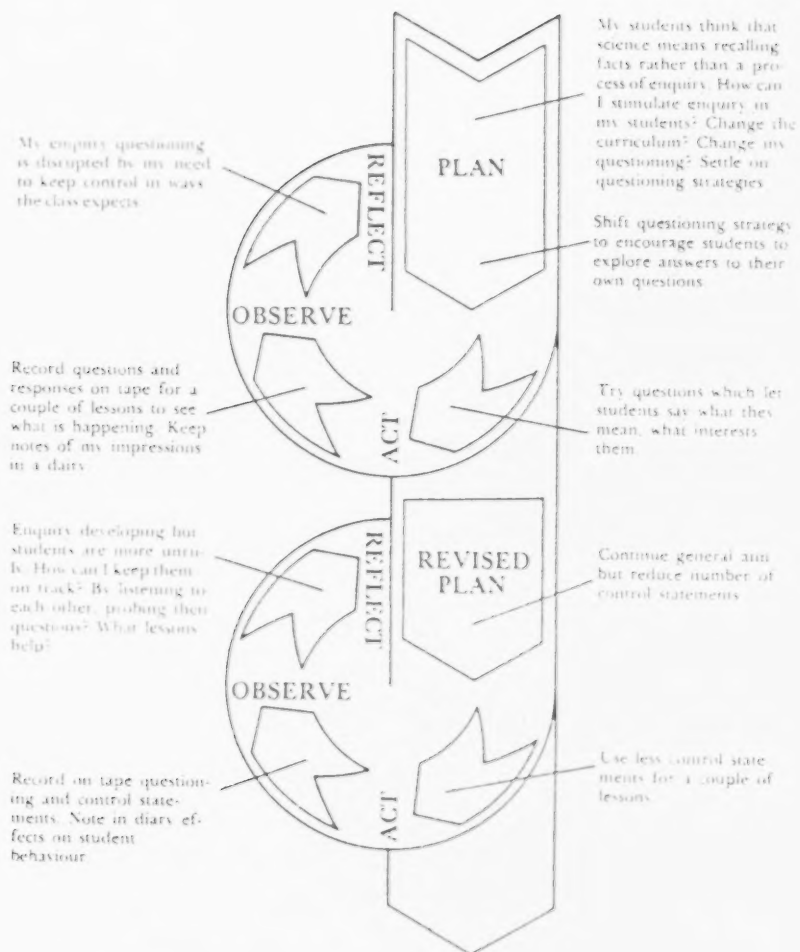
The recurrent cycles of three phases form the action research spiral, in which the learnings from one cycle

inform the strategic action of the next cycle. This process is represented diagrammatically in Figure 1(46).

It is the action research spiral of successive cycles, rather than a single cycle of three phases (planning, action and reflection) that enables improvement in rationality at the three levels cited in the definition provided above. Improvements perceived through "trying out" some of a range of alternative actions point to the direction of possible further modifications and investigation. Only through a related series of action research cycles which relate the practitioner's own self-reflection to the self-reflective work of professional colleagues can the practitioner gain a measure of collaborative self-control in professional development. What is escalating in the action research spiral is the individual's and the group's control over and rationality in personal and professional practice; the medium is the series of action research cycles.

It is during the monitoring phase of action research cycles that data or information about practice is assembled. Brown(47) lists a number of means by which teachers engaging in action research may gain a basis for self-reflection, including open-ended questionnaires, diaries, portfolios of lesson notes and minutes of meetings, "case studies" of individual students, taperecordings of lessons, and "structured observation" by an outside observer.

Figure 1: Action research in action



Structured observation by peers is facilitated in "group- (or cluster) based action research"(48). In this form of action research practitioners from a number of settings are drawn together because of similar curriculum or research interests and function as self-critical communities. As stated by Henry(49), features of group-based action research are firstly a concern to develop a project perspective around a mutual problem shared by a group of practitioners; secondly, an awareness of the worth of existing practice through the pooling of experiences; thirdly, a commitment to self-reflection; and fourthly, the development of skills in systematically monitoring practice and change. The functions of the "critical community" of an action research group include cooperation in monitoring and description of practice, and the analysis of and deliberation about issues and problems of mutual interest to members of the group.

(c) Characteristics of Action Research

Action research is not distinguished from other forms of educational research and evaluation by the means of assembling data cited above. It is distinguished by its method of recurrent cycles of planning, action and reflection, and by its "political theory". We will consider the "political theory" of action research under three headings: (i) view of the "phenomena" under study; (ii) participation and reflection; and (iii) ideology-critique.

(i) The view of the "phenomena" under study in action research.

The term "phenomena" is placed within inverted commas to indicate that while we are concerned with action research's analogue of the particulate matter which forms the object of physical science and the organic matter which forms the object of biological science, the sense in which the term is used is different to the conventional one. In physical and biological science, the particulate or organic objects of research are assumed to exist independently or "objectively". The "phenomena" of action research are educational practices -- practical human actions which are undertaken by practitioners in the process of education. In action research, these practices are studied by their practitioners with a view to professional improvement and the resolution of contradictions in their working lives.

The actions or practices that form the "phenomena" of action research are regarded differently, too, to the phenomena of applied sciences like human ethology. While dealing with the activities of humans, ethology treats such activities as behaviours able to be studied in the same objective fashion as particles and organisms -- as determined (for example, as responses to sets of stimuli). The notion of activities as determined responses to stimuli directs the attention of the researcher away from the interpretive categories (intentions, justifications and rationality) of the actor.

The "actions" of action research are conceived of in a more complex fashion than this: the activities of practitioners are regarded as praxis: action formed and directed by intentions, justifications and commitments. Action research directs the attention of the researchers towards the rationality of the actor (practitioner). "Action" is seen as a contingent component in a dialectical relationship with the practitioner's theory (that in terms of which the action is intelligible to the practitioner as educational action). In this dialectical relationship, actions are informed by the practitioner's theory (that is, the nature of prospective action is suggested by the theory), and actions inform the theory (retrospectively). Actions are a test of theory as much as they issue from theory. The interpretive categories of practitioners are in this way central in action research.

Moreover, the dialectic in which action is a contingent component is a double one. Actions are also dialectically related to the context of action: actions and practitioners' self-understandings are constrained and shaped by the limits imposed and opportunities provided by the structure of the setting in which they occur; and actions are a test of the extent to and ways in which the practitioner can shape the structure of the setting. Recognition of this second dialectic brings the social reality of the educational context into the ambit of action research (unlike interpretive research).

This double dialectic implicit in the notion of "action" in action research is diametrically opposed to the positivist notions of objectivity, independence and determinism implicit in the use in conventional research of such terms as "phenomena", "objects", "organisms", "treatments" and "behaviours". To understand the human actions of educational practice requires the explication of the subjective justifications and meanings in terms of which they are made intelligible, and an exploration of the practitioner/context relationship which constrains them.

(ii) Participation and reflection in action research.

Only practitioners can explore the double dialectic outlined above. Only practitioners are privy to the theories which guide their own actions, and only practitioners can explore the limits and opportunities of their situation. While outsiders can assist with the development of descriptive accounts of practice, they come to the setting replete with their own theoretical perspectives -- the practitioner must be involved if the relationship between private theory and personal practice is to be engaged. If the interpretive categories of the practitioner are not being represented, then action research is not occurring.

The relationship between practitioner-researcher and any outsider involved in the action research is crucial. It is common for "facilitators" to be involved in such

activities as

- * organising meetings of participants;
- * contributing to a developing pool of teaching ideas;
- * providing monitoring assistance (eg. audio-cassette recorders, typing of transcripts of taperecorded lessons);
- * providing emotional and intellectual support to participants.

However, the very acts (supportive though their intentions may be) of providing assistance in the form, for example, of curriculum ideas and materials, may themselves be pre-emptive. These acts may forestall attempts by practitioners to put up for scrutiny their own prior perspectives on curriculum (that is, to explicate their own "theory"). They may impose the facilitators' theories -- as manifested in the materials provided -- upon practitioners. These acts may, from the outset, begin to create dependence of practitioners upon facilitators, and this may in turn interfere with the attainment of "symmetrical communications" so important to the notion of a "critical community" built into group-based action research.

In action research, the locus of control must remain internal. The practitioner is the researcher: it is the practitioner who proposes the "hypothesis" (that improvement is possible in an aspect of personal professional practice), who empirically "tests the hypothesis" through his or her own practice, who engages in group deliberation about the relationship of theory and

practice, and whose decision it is to act in certain changed ways subsequent to that deliberation. The process is one in which practitioners conduct the research and as an outcome of the experience gain greater understanding of, and hence personal and collaborative control over, their own practices. The outcomes -- understandings about personal practice and its justifications, and the possibilities and limitations for improvement offered and imposed by the institutional context -- are grounded in personal praxis and are therefore "owned" by the practitioner and the participant group. In educational research and evaluation based on action research, access to and release of information is controlled by practitioners. "Ownership" and the internal "locus of control" may need to be protected by commitment of all participants to a set of negotiated "principles of procedure" which govern the research(50).

(iii) Ideology-critique

In much of what has been written above, the emphasis has been on the concern of action research with an explication of practitioners' theories and their relationship with practice. Action research is equally concerned with the other half of a double dialectic, however: the relationship between the power relations extant in practitioners' contexts of work on the one hand, and the nature of their self-understandings of personal practice on the other. Action research seeks not only to engage practitioners in a process of self-reflection about

the relationship between their own theory and practice, but also to engage practitioners in inquiries into ways in which their professional lives are determined by the structures and organisation of the situations in which they find themselves (for example, the historical and social conditions of institutional schooling). A fundamental characteristic of action research, then, is ideology critique, which

is aimed at revealing to individuals how their beliefs and attitudes may be ideological illusions that help to preserve a social order which is alien to their collective experiences and needs. By demonstrating how ideological forces generate erroneous self-understandings, ideology critique aims to reveal their deceptive nature and so strip them of their power(51).

It is clear that action research, which seeks to create the conditions for ideology critique, serves an emancipatory knowledge-constitutive interest. It seeks to engage practitioners in inquiries which will enable them to free themselves from "the dictates of irrational or unjust habits, customs, precedents, coercion, or bureaucratic systematisation"(52).

(d) An Example of Action Research in Environmental Education

Section 5.2 of Chapter 5 outlines an example of action research in environmental education. Seven teachers with a general interest in curriculum and teaching issues in environmental education formed an action research group (the School-based Environmental Education (SBEE) group) for a period of six months. The action research

methodology of participation in recurrent cycles of planning, action and reflection within a "critical community"(53) was adopted.

One teacher's initial teaching issue was a dissatisfaction with the scope that his questioning allowed for pupils themselves to ask searching questions of each other and of adult figures about environmental problems -- this issue became the object of his research. The object of this teacher's research (his questioning) was not assumed to exist independently or objectively: the teacher's approach to questioning was recognised by the teacher and the group as "loaded" with a particular view or theory of education. The teacher's intention to act in a certain way (to change the pattern of his and his pupils' questioning) was explained by the teacher in terms of his view that environmental education ought to develop in pupils a capacity for critical questioning(54):

It is a necessary part in environmental education that children have a chance to express their opinions, and that it is important that these opinions are considered and looked at as being valuable.

Children need to be effective questioners if real learning is to take place, and...effective environmental education programs will not succeed without children asking these questions.

One of the features to be looked at was the idea of neutral chairmanship. It was necessary to see in the light of my previous statements if in fact I was acting in a way to allow children to discuss and question among themselves, while at the same time keeping control over the classroom members' behaviours.

In other words, the object of the research (the teacher's management of questioning) was seen as "theory-in-action"

-- as actions supported by justification and commitment. This dialectical notion, which orientates the research to the relationship between the teacher's interpretive categories and his/her educational practices, rejects the positivist assumption that the object of research is objective, independent or neutral.

The action research reported in section 5.2 had both individual and collaborative moments. Members of the research group acted as individuals in choosing a teaching issue for research (an aspect of their teaching with which they were personally dissatisfied), the choice of monitoring techniques (these were chosen on the basis of perceived sensitivity to the teaching issue in question), and reflection on personal theory and practice. The teacher who chose the issue of "management of questioning" monitored his educational practice using such techniques as taperecording, observation (by another teacher in the school), pupil and teacher interviews (by the facilitator), photography, and written records compiled by teacher and pupils. And his self-reflections, after attempts to encourage pupils' questioning about a number of local environmental issues, touched on such matters as (pupils') activity group size, role play and participation, "neutral chairmanship", and the availability of environmental issues as vehicles for development of pupils' questioning skills. On the last point, he commented:

Environmental issues of interest to the children are rare, perhaps too rare to keep an environmental education program going at an

acceptable rate. Environmental issues are moments in history and children's interest in them cannot be artificially created(55).

Collaborative moments occurred when participants were planning their next "action steps" (that is, there was much swapping of practical teaching ideas), and when the group as a whole reflected on the recently-described practical experiences of individual members at group meetings. For example, when the group discussed the issue of "institutional constraints confronting the adoption of environmental education in schools", some constraints which had tended individually to be regarded as fixed and unyielding came to be seen by the group as context-dependent -- and therefore, perhaps, subject to change. Two of the comments at an SBEE meeting(56) on the institutional constraint of discipline-based timetables were:

Social studies, Health, Science, Library, and Art follow set curriculums most of which are school-based. They have specific grade-level requirements which are expected to be followed, therefore the place of environmental education in such a subject oriented structure is one of isolation and is perceived this way by many of the staff(57).

The opportunities for environmental education in my school were mainly due to the freedom I had within the classroom. The timetabling for me was flexible, with no team-teaching commitments, so that I could fit in extended lessons if I wanted to(58).

Other institutional constraints addressed by the group were the shortage of staff support available for out-of-school activities, and the lack of funding for excursions.

Action research in environmental education (as reported in section 5.2) appears to permit the following outcomes:

- (i) The development of greater personal control over professional practice.

Though a process of personal and collaborative deliberation on the significance of strategic action, individual and group control over professional practice improves. In short, the relationship of interpretive categories, educational practices and institutional factors becomes better understood. This point, as it applies to the individual teacher, is described in the SBEE project report:

It should also be noted that the teacher had control over the analysis of information gained through these monitoring techniques. For example, the teacher initially simply tallied the number of teacher utterances and the number of pupil utterances in order to "get a feel for" the extent to which he dominated classroom discourse. Later, however, as he sharpened his perception of the relationship he was exploring, he developed a far more complex analysis sheet for distinguishing between his own utterances (in terms of the intellectual demand on students built into them) and between pupils' utterances (in terms of the factual and relational complexity of their questions and responses. It is important to realise that the increasingly complex techniques of monitoring and analysis are indicators of the teacher's increasingly complex and powerful grasp and understanding of his own teaching. As the teacher's grasp of the complexity of his interactions with children improved, he gained greater control over his own personal development and accordingly his professional work became more and more rational. (The term "rational" is used here to qualify educational decision-making that is grounded in a personal understanding of the implications of personal practice).

The "close up" example of action research discussed above may appear to some to be concerned with a fairly trivial matter. However

the dissatisfaction cited as the initial "teaching issue" relates strongly to the teacher's conception of environmental education and had to be resolved (in the teacher's view) if his environmental education practice and the school's environmental education program were to improve. It was the view of this teacher, and of the school-based EE project, that the resolution of these kinds of teaching issues is crucial to improved EE, and that their resolution ought to be a matter of self-initiated change based on raised consciousness about the relationship between personal teaching practice and personal conceptions of EE ...(59).

Action research contributes to improved rationality of educational practice by creating the conditions (a group orientation to problems and issues, participant control over the research work, a critical examination of educational practices in the light of interpretive categories) for improved understanding of the relationship of theory (interpretive categories) and practice.

(ii) scrutiny of unintended consequences of actions.

The structure of an action research study enables unintended consequences of actions to be "picked up" and engaged by the participants in the research. The "monitoring" phase of the process is eclectic and collaborative and focused squarely on educational actions: a range of methods is employed by two or three people (in the SBEE study) without the "structured blindnesses" imposed by the pre-ordinate designs of positivist approaches. Examples of unintended consequences detected by participants in the SBEE include the absence of total pupil involvement in an open class discussion, the reaction of pupils that the

teacher's presence was detrimental to such open class discussion, and the inability of pupils to carry out the role of "mayor" in a simulated town meeting.

Further, once unintended consequences of actions are detected, they become the subject of group reflection and deliberation, and (importantly) the outcomes of such reflection and deliberation become part of the developing theory of the group, and are included in accounts of the research. This does not necessarily occur in interpretive research, where the accounts developed by the outside researcher will refer only to those aspects of the interpretive categories of teachers which justify intended consequences of actions.

(iii) awareness of the influence of social structures on individual practice.

Action research contributes to a more developed awareness of how institutional or social structures shape individual and group practices. The most-discussed example, in the SBEE and other projects described in Chapters 4 and 5(60), was the influence that the conventional "forms of knowledge" view had on educational practices conducted in the classroom in the name of environmental education. The view that knowledge is "naturally", or ought to be, organised into discrete discipline-based "subjects" -- whether such organisation occurs in schools, teacher-training institutions, or broader society -- was perceived by participants as constraining environmental education in a way that

favors "education about the environment". For participants in the SBEE, the conventional "forms of knowledge" view creates the impression that:

prior environment-related knowledge is a pre-requisite for teachers to have confidence to manage future investigations of an environmental issue and potential future action. This orientation gives firm support to the existence of traditional knowledge-based teacher training, and also to a hierarchy in which the teacher is seen as an authority-in-knowledge. This thinking leaves the locus of classroom control with the teacher, and runs contrary to the democratic notions of a program aimed at socially-critical education.

Similarly, for pupils, it is "conventional wisdom" that a previous thorough understanding of basic ecological principles, for example, improves the sensitivity of pupils to potential environmental problems. On the other hand, the perceived need for pupils to have a conceptual base prior to an issues investigation may lead the teacher once again to control the flow of knowledge in the classroom, thereby interfering with development of pupils' autonomy and responsibility in critiquing an environmental issue(61).

By raising the consciousness of participants about the way that assumptions (for example, about the structure of knowledge) made and sustained in social settings other than that represented by their own classroom can constrain their own thoughts and actions, action research creates the conditions for ideology critique.

(e) Action Research and the Educational Problem of Environmental Education

This Chapter has considered three forms of educational research in terms of their capacity to address, and to support critical analysis of, the educational problem of

environmental education. The characteristics of a coherent form of educational research, adduced from the preceding Chapters, are:

- * It must recognise the interpretive categories of practitioners -- their "presuppositions about teaching and curriculum".
- * It must recognise the technologising effect of the hegemony ("dynamic stability") between the dominant view of educational change, institutional structures, and technicist expressions of the innovation.
- * It must construe the educational problem of environmental education as constituted of discrepancies between individual theory and practice (false consciousness), and between individual theory and practice on the one hand and social structures and relations on the other(hegemony).
- * It must provide a means for closing individual and individual/social theory-practice gaps -- it must address ideology as false consciousness and hegemony.

The three forms of educational research considered were positivist, interpretive, and critical approaches. Of these, it is argued that critical approaches (exemplified by action research) transcend the others in their ability to engage the educational problem of environmental education. Positivist approaches, by virtue of their concern with objectivity and instrumental rationality fail to engage the educational aspect of educational problems -- their empiricist drive and technical interest causes them to ignore the educational rationale invoked by

practitioners in justifying their actions. Interpretive approaches, by virtue of their method of verstehen, do engage practitioners' educational beliefs and assumptions (in short, their interpretive categories) which inform educational actions. However, by virtue of their subjectivist epistemology, according to which practitioners have no access to independent criteria for arguing that alternative constructions of practitioners' interpretive categories ought to be seriously considered, they are unable to guarantee that practitioners do in fact reflect critically upon the relationship of belief and action. By default, interpretive approaches fail to engage those cases in which there is a dissonance between practitioners' beliefs on the one hand and their actions on the other. Thus, it can be argued that interpretive approaches fail to come to grips with the real nub of educational problems (62). That is,

- * Positivist approaches can be rejected as incoherent: as a consequence of their empiricist (objectivist) epistemology, they are unable to recognise the significance of either practitioners' interpretive categories or the hegemony of institutional education.

- * Interpretive approaches are coherent to the extent that they recognise and engage the interpretive categories of practitioners, but inadequate because they are incapable of offering explanations of unintended consequences of actions and they are unable to engage in ideology-critique.

Section 10.3 has argued that action research, as an

example of a critical approach to educational research, is a coherent and adequate form of educational research for environmental education in that it transcends the limitations of interpretive approaches in three respects:

(i) it engages the educational aspects of educational problems (by virtue of its concern with interpretive categories of practitioners) and treats them as problems (by its method of engaging practitioners in a double dialectic of critical reflection on personal belief, practice and circumstance).

(i) it engages unintended consequences of actions -- or put another way, it engages personal theory-practice gaps by providing practitioners with the skills and resources for critically appraising alternative interpretive constructions of the subjective meanings of their actions, and

(ii) it engages in ideology-critique -- that is, in the critical appraisal of the structure and relations that engender and sustain the beliefs and assumptions that guide practitioners' actions.

Judged by the above criteria, action research, as an example of a critical approach to educational research and unlike positivist and interpretivist approaches, is adequately justified and coherent as a form of educational research for environmental education.

NOTES

1. In particular at about this time (1975), Robert Stake's concept of responsive evaluation (Stake, R. "To evaluate an arts program" in Evaluating the Arts in Education. Wooster, Ohio: Bell and Howell, 1975) was becoming influential. In Stake's words,

An education evaluation is responsive evaluation if it orients more directly to program activities than to program intents; responds to audience requirements for information, and if the different value-perspectives present are referred to in reporting the success and failure of the program.

Responsive evaluation was conceived as an alternative to "pre-ordinate evaluation which emphasised the determination of fidelity between educational outcomes (usually student performances) and educational intents" -- that is, to the dominant (positivist) perspectives existing to that time. Stake's concept cleared the way for the emergence of a number of alternative perspectives in the balance of the decade.

2. See Iozzi, L. (ed.) Environmental Education Information Report: Research in Environmental Education 1971-1980. Ohio:ERIC/SMEAC, 1981. Iozzi presents a review of environmental education research literature in the period 1971-1981. The majority of the research reviewed is based on the same view of educational evaluation as Bennett's "state of the art" paper.

3. Bennett, D. "The evaluation of EE learning". In UNESCO Trends in Environmental Education. Paris: UNESCO, 1975.

4. See UNESCO. The International Workshop of Environmental Education, Belgrade, Yugoslavia, 13-22 October 1975. Final Report, ED.76.WS/95 Paris: UNESCO, 1977.

5. See Stufflebeam, D. "Educational evaluation and decision-making" in Worthen, B., and Sanders, J. (eds.) Educational Evaluation: Theory and Practice. Belmont, California: Wadsworth, 1973; and Stufflebeam, D., "Alternative approaches to educational evaluation: a self-study guide for educators", in Popham, W. (ed.). Evaluation in Education. Berkeley, California: Berkeley, 1974.

6. Cronbach, L. "Course improvement through evaluation". Teachers College Record 64 (8): 672-683, 1963.

7. Scriven, M. "The methodology of evaluation". Chapter 1 in Perspectives of Curriculum Evaluation. Washington, D.C.: AERA Monograph Series on Curriculum Evaluation, 1967.

8. Bennett, D. (op. cit -- see note 3).

9. Another example illustrating this point is presented by Kelly, P.J. "What do we really mean by EE?" In

Hughes-Evans, D. Environmental Education: Key Issues of the Future. Oxford: Pergamon, 1977.

10. Bennett, D. (op. cit. -- see note 3).

11. Codd, J. "Epistemology and the politics of educational evaluation". In Deakin University, Curriculum Evaluation: philosophical and procedural dilemmas. Geelong, Victoria: Deakin University, 1982.

12. Carr, W. and Kemmis, S. Becoming Critical: Knowing Through Action Research. Geelong, Victoria: Deakin University, 1983. The authors acknowledge the arguments of R. S. Peters in their discussion of this point. See Peters, R. S. "Education as Initiation" in Archambaut, R. Philosophical Analysis and Education. London: Routledge and Kegan Paul, 1965.

13. Carr, W. and Kemmis, S. (op. cit -- see note 12).

14. See Chapter 2, section 2.3.

15. Stake, R. "To evaluate an arts program". Chapter 2 in Evaluating the arts in education: A responsive approach. Columbus, Ohio: Charles E. Merrill, 1975.

16. Parlett, M and Hamilton, D. "Evaluation as illumination". Chapter 5 in Tawney, D. Curriculum Evaluation Today: Trends and Implications. London: Macmillan, 1976.

17. Adelman, C., Jenkins, D. and Kemmis, S. "Rethinking case study: notes from the Second Cambridge Conference". Cambridge Journal of Education 6 (3): 139-150, 1976.

18. Eisner, E. "The forms and functions of educational connoisseurship and educational evaluation". In Eisner, E. (ed.) The Educational Imagination. New York: Macmillan, 1979.

19. Hamilton, D. "Making sense of curriculum evaluation: continuities and discontinuities in an 'educational idea'". Review of Research in Education vol. 5. Itasca: Peacock, 1977.

20. (a) Stake, R. (op. cit. -- see note 15).

(b) Stake, R. "The countenance of educational evaluation". Teachers College Record 68 (7): 523-540, 1967.

21. Stake, R. (op. cit -- see note 15).

22. Kemmis, S. "Telling it like it is: the problem of making a portrayal of an educational program". In Rubin, L. (ed.) Handbook of Education. Boston: Allyn and Bacon, 1976.

23. Stake, R. (op. cit. -- see note 15).

24. Stake, R. (op. cit. -- see note 15).
25. See Chapter 2, section 2.3.
26. Parry, L. "Initiating Curriculum Planning in Environmental Education: A Case Study". Paper presented at the Open Forum Session, Third Biennial National Conference of the Australian Association for Environmental Education, Sydney University, August 1984.
27. Parry, L. (op. cit. -- see note 26).
28. Parry, L. (op. cit. -- see note 26).
29. Parry, L. (op. cit. -- see note 26).
30. Parry, L. (op. cit. -- see note 26).
31. Parry refers here to Walker, D. "Curriculum Development in an Art Project" In Reid, W. and Walker, D. Case Studies in Curriculum Change. London: Routledge and Kegan Paul, 1975.
32. Parry, L. (op. cit. -- see note 26).
33. See Chapter 7.
34. McFarland, M. "For every child: a tree". Science and Children April:6, 1974.
35. Brewer, M. cited in Colpitts, W. "Challenges and Opportunities in Interpretive Programs". Journal of Environmental Education 11 (1): 10-13, 1979.
36. See Carr, W. and Kemmis, S. (op. cit -- note 12).
37. See Carr, W. and Kemmis, S. (op. cit -- note 12).
38. Carr, W. and Kemmis, S. (op. cit -- see note 12)
39. Carr, W. and Kemmis, S. (op. cit -- see note 12).
40. Codd, J. "Educational research as political practice". Paper presented to the Australian Association for Research in Education. National Conference. Canberra: November, 1983.
41. Carr, W. and Kemmis, S. (op. cit -- see note 12).
42. Carr, W. and Kemmis, S. (op. cit -- see note 12).
43. See Chapter 2, section 2.3.
44. Carr, W. and Kemmis, S. (op. cit. -- see note 12).
45. Kemmis, S. "Action Research". In Husen, T. and Postlethwaite, T. (eds.). International Encyclopaedia of Education: Research and Studies. Oxford: Pergamon, in press.

46. Deakin University. The Action Research Planner. Geelong, Victoria: Deakin University, 1981.
47. Brown, L. Action Research: The Teacher as Learner. Mimeograph, Victorian Education Department, 1981.
48. See for example: Henry, J.A. et al. "The Professional Development of Teachers through Involvement in Action Research Projects". Papers presented in a symposium at the Annual Meeting of the South Pacific Association for Teacher Education, Adelaide, July 22-26, 1981.
49. Henry, J.A. "Group-based Action Research at Deakin: Some Background and an Introduction". (op. cit -- see note 48).
50. For an example of a set of prepared "principles of procedure", see Kemmis, S. and Robottom, I. "Principles of Procedure in Curriculum Evaluation". Journal of Curriculum Studies 13(2): 151-155, 1981.
51. Carr, W. and Kemmis, S. (op. cit -- see note 12).
52. Carr, W. and Kemmis, S. (op. cit -- see note 12).
53. See Chapter 5, section 5.2.
54. Robottom, I. "School-based Environmental Education: Some classroom research issues". Paper presented at the 13th Annual Conference of the North American Association for Environmental Education: International Perspectives in Environmental Education: Issues and Actions Banff, Canada: Octoberr, 1984.
55. Robottom, I. (op. cit. -- see note 54).
56. Robottom, I. (op.cit. -- see note 54).
57. Robottom, I. (op. cit. -- see note 54).
58. Robottom, I. (op. cit. -- see note 54).
59. Robottom, I. (op. cit. -- see note 54).
60. See Chapters 4 and 5.
61. Robottom, I. (op. cit. -- see note 54).
62. Carr, W. "Educational Research as Science". Geelong: Deakin University mimeograph, 1980.

CHAPTER 11: RESONANCES IN ENVIRONMENTAL EDUCATION AND
EDUCATIONAL RESEARCH (1)

11.1 Preamble

Part I (Chapter 1) of this thesis provided a selective outline of issues in the fields of environmental education, educational innovation, and educational research. The purpose of this Part was to demonstrate the interrelationship of these issues and to provide an interim justification for addressing the four stated theses.

Part I (Chapter 2) of the thesis presented a range of perspectives in each of "scientific knowledge", "educational innovation", "educational research and evaluation", and "education" itself. From this range of perspectives was composed a "framework for critique" -- a means for analysing developments in the field of environmental education.

Accounts of a number of developments in environmental education at the international, national and local levels were presented in Part II. These accounts included a selective history of environmental education since the 'seventies, and brief versions of the reports of four research projects engaged in by the author.

The framework of critique of Part I and the accounts of developments in environmental education presented in Part

II enabled the closer analysis and presentation of arguments and evidence in Parts III and IV that justify the four theses. A summary of the arguments adduced in justification of the theses is provided in the remainder of this Chapter.

11.2 Contestation and Continuity

Contestation is the opposition of conflicting points of view among those who seek to bring about social reform, and between advocates of reform and advocates of continuity of existing practices and structures. Contestation is a process in which self-interested individuals and groups in a social organisation cooperate, compete and negotiate in a complex interaction that yields solutions to social problems -- solutions that are temporary in the sense that their currency is constrained by the social and political conditions obtaining at the time of their generation.

Environmental education is perceived as an educational reform: it is portrayed by many as offering structural, political, and epistemological challenges to institutional education.

It has been shown that in environmental education, there is contestation at the level of language: different definitions, claims about intentions, and proffered guiding principles can be traced to conflicting views of knowledge, innovation, research and education. Though

contested, the language of environmental education tends to sustain a politicised, socially-critical form of meaning ("education for the environment"); it is only by virtue of its socially-critical character that environmental education is a coherent response to the political nature of community concerns about the "environmental crisis" that gave rise to the environmental education movement.

It has also been shown that contesting educational practices are justified by reference to conflicting views of knowledge, innovation, research and education. "Education about the environment" and "education in the environment" are also regarded as environmental education, but it has been shown that they involve internal contradictions that reproduce rather than transform education and the conditions which produce environmental problems. "Education for the environment" -- which embraces the "vision" of the Belgrade and Tbilisi conferences -- escapes these contradictions. However, "education for the environment" is rarely achieved because it is "held back" by such institutional structures as the primacy of disciplines, technical views of innovation and positivist views of educational research, which reproduce rather than transform education (including environmental education). That is, educational practices, though contested, tend to express the non-politicised, non-socially-critical "education about and in the environment": such practices represent continuity in the face of contestation -- reproduction rather than

transformation.

The first thesis justified by the arguments presented here is thus:

while the language of environmental education, though contested, advocates educational reform ("education for the environment"), educational practices conducted in the name of environmental education, though also contested, represent continuity rather than change, to the extent that the innovation fails to meet its socially-critical aspirations.

11.3 Technologisation

The dominant perspective on innovation is technicist/managerial (centre-periphery; RDDA). It has been shown that while assuming the trappings of neutrality by virtue of its objectivist epistemology, the politics of innovation in the name of environmental education turn out to be the politics of continuity. This dominant perspective on innovation accepts and employs institutional characteristics and some popular interpretations of environmental education which reproduce rather than transform educational aspirations and practices, and thus confront attempts at educational reform with a dynamic stability in the face of change. Specifically, centre-periphery strategies of change, conventional didactic teaching and disciplinary curriculum practices, and interpretations of environmental education as "education about the environment" interact symbiotically to reinforce each other in a way which resists fundamental educational reform. By employing

institutional structures, "education about the environment" tends to treat them as unproblematic, to accept them, and not to challenge them, thus sustaining and reproducing the very conditions that "education for the environment" seeks to transform. In addition to continuing the "surface features" of institutional structures and practices, this dominant perspective employs and sustains, and therefore reproduces, an entire view of knowledge and of social order.

Organisational strategies informed by the technicist view of innovation ("imported" goals; little discourse with practitioners; power-coercive measures; the use of teacher competencies; instrumental research and evaluation) reinforce existing conditions and procedures in conventional education, including the system-based mechanism for the "control" of practitioners. The positivist ideology of these organisational strategies of change defines practitioner professionalism in such a way as to deny practitioners the autonomy and responsibility required to recognise the incoherence of certain contesting perspectives, and to challenge the dynamic stability resisting change. The innovation, which was developed with a view to transforming education, is thus coopted within existing structures for educational provision: the innovation is "technologised".

The second thesis is:

the presently dominant models of educational innovation expressed in the organisation of the

innovation are part of an hegemonic relationship which acts to "technologise" the innovation: it masks the logical incoherence of certain contesting perspectives and practices, thereby contributing to continuity rather than reform.

11.4 The Educational Problem of Environmental Education

Having implicated the dominant model of educational innovation in the "technologisation" of environmental education, it is now necessary to recast the educational problem posed by continuity of practices in such a way as to throw the hegemony into relief. Conventional explanations of the continuity of environmental education practices are in terms of a large-scale theory-practice gap, where the "theory" is the language and policy of the international academy, and the "practice" is classroom teaching. This is a distorted view of the relationship of theory and practice which diverts attention away from the manner in which environmental education is organised, and diminishes the perceived need for practitioners to exercise their critical intelligence.

A more coherent construction is that the educational problem of environmental education comprises a series of theory-practice gaps at all levels, where "theory" is the set of beliefs and assumptions held by individual practitioners, and in terms of which they understand their educational practice. An educational problem exists because these theory-practice gaps exist; the educational problem continues because these theory-practice gaps exist unacknowledged within the organisational infrastructure of

environmental education. They are at once maintained and denied by a distorted view of "educational theory". An interpretation of "educational theory" as rational criticism by those engaged in educational pursuits of the relationship of personal theory and practice is more powerful than that which equates it with the language and policy of the academy. Its dialectical epistemology acknowledges practitioners' language and interpretive categories and the interactive relationship of language and categories on the one hand, and personal and institutional practices on the other. This view of educational theory encourages critique: its interests are emancipatory. Educational theorising has the capacity to act as an antidote to technologisation.

11.5 Contestation and Coherence in Educational Research.

Just as there are a number of conflicting points of view "contesting the ground" in the field of environmental education, so there are several contesting perspectives on educational research. We are now in a position to determine which of these represents a coherent and adequate response to the educational problem of environmental education.

Positivist approaches are incoherent. Such approaches fail to acknowledge the language, interpretive categories and assumptions that guide the practice of individual practitioners; it construes "educational problems" as "rhetoric/reality gaps", or the failure of teachers to

match their practice to the policy of those in authority; it construes the purpose of educational research as informing educational decisionmakers about the most effective ways to achieve their goals; it construes the activity of educational research as instrumental determination of the fidelity of outcomes to goals. Positivist educational research thereby fails to engage and contest the dynamic stability afforded by the organisation of environmental education to qualitative change. Under the guise of neutrality (allegedly conferred by an objectivist view of knowledge), and non-politicisation, positivist approaches express the politics of continuity.

Interpretive approaches are coherent to the extent that they engage the interpretive categories of practitioners -- or regard "theory" as the beliefs and assumptions guiding the actions of practitioners. However the exclusiveness of this concern with the interpretive categories of practitioners contributes to a weakness of interpretive approaches when dealing with the educational problem of environmental education. In stressing the articulation of subjective meanings of actions within educational contexts, interpretive approaches fail to address how the range of meanings is influenced by the power relations extant in institutional education -- it is incapable of ideology-critique. Interpretive approaches are inadequately justified.

Critical approaches such as action research aim at

knowledge in the form of a critique of "the ways and extent to which existing forms of communication may be systematically distorted by prevailing social, cultural or political conditions"(2). Critical approaches like action research transcend positivist and interpretive approaches in the sense that they engage the educational aspects of educational problems (by virtue of their concern with interpretive categories of practitioners) and do treat them as problems (by their method of engaging practitioners in the double dialectic of critical reflection on interpretive categories, and of ideology-critique of the constraints of circumstance).

The third thesis justified by these arguments is:

the "technologisation" of the substance of environmental education and institutionalisation of environmental education as an innovation cannot be addressed from within conventional approaches to educational research (positivist; interpretive) but can be addressed from the critical perspective of ideology critique.

11.6 Educational Research "Against", "About", and "For" Environmental Education

Commenting on the "heterogeneous collection of ideas" that (for him) characterises the field of curriculum theory, Shaw(3) explicates Gallie's(4) notion of "essentially contested concepts":

Gallie argues convincingly that a number of important concepts in such areas as art, politics, morality, or religion serve different functions for particular groups, parties or sects. Each has its own interpretation of the concept, and these are not unconscious

rationalisations nor sophisticated special pleading; they are quite genuine. About these concepts Gallie writes, disputes "although not resolvable by argument of any kind, are nevertheless sustained by perfectly respectable arguments and evidence. This is what I mean by saying that these are concepts which are essentially contested, concepts the proper use of which inevitably involves endless disputes on the part of the users"(p. 158).

Shaw proposes that curriculum is such an area, being concerned with essentially contested concepts like "education", "valued knowledge", "discipline", "freedom", and "autonomy". The present thesis takes the same position with respect to environmental education, and could add to Shaw's list with such essentially contested concepts as "environmental education", "environment", "environmental problem", "educational innovation" and "educational research".

Gallie claims that the "proper use" of essentially contested concepts is discourse and debate about "their proper uses on the part of the users" -- a view that this thesis endorses in respect of "environmental education". While the rational, technicist model of educational change aims at a single rationale for action -- in short, it aims at consensus -- Gallie's notion precludes lasting consensus. However, such a situation is not irrational according to Gallie; he claims that "when differing interpretations of the same essentially contested concept are at issue, rationality figures strongly, but takes different shapes"(5). Shaw acknowledges the difficulty of obtaining lasting consensus in a field characterised by contestation, but suggests that discourse may result in

conditional agreement on appropriate action -- agreement that is strongly socially and historically located:

Yet it is not beyond hope, nor outside common experience, that professional people would, after discussion, endorse a particular decision as reasonable in the circumstances, whilst knowing that it is not the one they would, as individuals, take. The next time the limiting conditions change, the debate can be reopened with the possibility that an alternative view, justified by an alternative interpretation, might prevail. Meanwhile negotiation has produced not a firm and irrevocable consensus, but a limited working agreement for the here and now, which enables progress to be made(6).

Given the contested nature of environmental education and educational research, as established earlier in this thesis, is it possible to propose a form of educational research which, for the time being, can be agreed to represent a rational, coherent response to the educational problem of environmental education?

The "framework of critique" developed in Chapter 2 of this dissertation indicated the relationships of contesting views of scientific knowledge, innovation, research, and education. It was argued

(i) that empiricist conceptions of science, technical conceptions of innovation, positivist approaches to research, and vocational views of education are coherent, but suffer from a number of unanswered criticisms;

(ii) hermeneutic/subjective conceptions of knowledge, interpretive approaches to research, and liberal views of education are coherent, but also suffer from a number

of unanswered criticisms;

(iii) post-empiricist/dialectical conceptions of knowledge, ideological perspectives on innovation, critical approaches to research, and socially-critical views of education are coherent.

It is now possible, in the light of Chapter 10, to extend the analysis of coherence to include resonances with environmental education.

The criterion invoked in this appraisal of coherence of perspectives is their underlying epistemology. Clearly, after Chapters 8 and 10, it is in the sense that they are informed by a post-empiricist view of scientific knowledge that ideological perspectives on innovation and critical approaches to educational research are coherent with environmental education. Post-empiricist conceptions of science point to the paradigmatic or presuppositionalist nature of knowledge: attention is drawn to the role of ideology in supporting the community structure of science and education(7). Environmental education constitutes an educational problem because its presuppositionalist character is obscured. At the level of organisation, the environmental education community is at once espousing a commitment to educational reform and enacting a commitment to a positivist set of values which support constraints to change. Only those views of innovation and research which assume and seek to characterise and critique the presuppositionalist nature of education can render these constraints transparent and subjective, and amenable to

change.

Approaches to educational research which are based on an objective, empiricist epistemology act in support of positivist ideology and can be regarded as research against the reconstruction of environmental education as "education for the environment". Interpretive approaches, which are capable of describing the positivist ideology of existing organisational strategies in environmental education but are, as a result of their subjectivist epistemology, not capable of ideology-critique, can (at best) contribute to a greater understanding of the educational problem of environmental education -- they may even, by default, end up confirming the very ideology that gives rise to continuity of practice in environmental education. Interpretive approaches can be termed research about environmental education. Only those critical approaches to educational research which are informed by a post-empiricist/dialectical view of knowledge can be regarded as research for the improvement of environmental education. Only these approaches reconcile facts and values in a way that enables the effects of ideology to be appreciated, and reconcile knowledge and action in a way that enables participants to reconstruct their professional predicament by diminishing the oppressive influence of ideology.

Thus, at present, the argument is for environmental education as "education for the environment", and for a critical approach to educational research such as action

research. While this should not be thought of as being above the process of contestation for which this thesis has argued, for the time being, however, they are both the best justified and most promising approaches for environmental education and educational research in the future.

As Bredo and Feinberg(8) put it:

While the overall verdict is still out on critical theory, from the present standpoint it appears to offer a promising new basis for understanding the nature of social and educational knowledge and for helping to create a society that is better fit for all its members.

The fourth thesis is that:

a coherent epistemology of environmental education, educational change and educational research -- a critical perspective that links facts and values, knowledge and action, and engages in ideology-critique -- is required if the socially-critical aspirations of environmental education are to be comprehended and supported.

NOTES

1. This Chapter is, in part, a summary of the main propositions of this dissertation. Sections 11.2, 11.3, 11.4 and 11.5, therefore, are re-presentations of the conclusions of Chapters 6 to 10. These re-presented propositions, which support the first three theses of the dissertation, prepare the ground for the discussion in section 11.6, which supports the final thesis of the dissertation.
2. Carr, W. and Kemmis, S. Becoming Critical: Knowing through Action Research. Geelong, Victoria: Deakin University, 1983.
3. Shaw, K. "Paradigms or contested concepts", British Journal of Educational Technology, 7 (2): 18-24, 1976.
4. Gallie, W. Philosophy and the Historical Understanding. London: Chatto and Windus, 1964.
5. Gallie, W. Paraphrased in Shaw, K. (op. cit. -- see note 3).
6. Shaw, K. (op. cit. -- see note 3).
7. See Smolicz, J. "Fragmentation in Science and Education: an analysis of the community structure of science". In Murray-Smith, S. Melbourne Studies in Education 1974. Melbourne University Press, 1974.
8. Bredo, E. and Feinberg, W. Knowledge and Values in Social and Educational Research. Philadelphia: Temple University Press, 1982.

Appendix 1: Goals, Objectives and Guiding Principles of Environmental Education

(See UNESCO. Environmental education in the light of the Tbilisi Conference. Paris: UNESCO, 1980).

1. Goals:

- (a) to foster awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- (b) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;
- (c) to create new patterns of behaviour of individuals, groups and society as a whole towards the environment.

2. Categories of environmental education objectives:

Awareness: to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems;

Knowledge: to help social groups and individuals gain a variety of experiences in, and acquire a basic understanding of the environment and its associated problems;

Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection;

Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems;

Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

3. Guiding Principles

EE should:

Consider the environment in its totality -- natural and built, technological and social (economic, political, technological, cultural-historical, moral, aesthetic);
Be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages;

Be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;

Examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas;

Focus on current and potential environmental situations, while taking into account the historical perspective;

Promote the value and necessity of local, national and international co-operation in the prevention and solution of environmental problems;

Explicitly consider environmental aspects in plans for

development and growth;

Enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;

Relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;

Help learners discover the symptoms and real causes of environmental problems;

Emphasise the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;

Utilise diverse learning environment and a broad array of educational approaches to teaching/learning about and from the environment with due stress in practical activities and first-hand experience.